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DEPARTMENT OF HEALTH & HUMAN SERVICES

Public Health Service
Centers for Disease Control

Memorandum

Date August 1982

From Chief, Research and Evaluation Staff
Health Education Division
Center for Health Promotion and Education

Subject Administrative Reviews and Critique of the Preliminary Version of "A Program Evaluation Handbook for Health Education Programs in Exercise"

To American Public Health Association Workshop Attendees
CDC-Workshop Attendees

The attached preliminary document is for your technical review and comment only. Questions and suggestions regarding this report should be addressed to me at the following address:

Centers for Disease Control
Center for Health Promotion and Education
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Atlanta, Georgia 30333

Walter J. Gunn

Walter J. Gunn, Ph.D.

Attachment

HE 20.7008:

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(PRELIMINARY VERSION*)

A PROGRAM EVALUATION HANDBOOK

FOR

HEALTH EDUCATION PROGRAMS

IN

EXERCISE

for the

CENTERS FOR DISEASE CONTROL
Center for Health Promotion and Education
Atlanta, Georgia 30333

by

IOX Assessment Associates
Culver City, California 90230

Contract No. 200-81-0622

September 1982

* This handbook contains measures which have not yet been subjected to empirical verification. A subsequent project to validate the measures for use in health education programs is planned.

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PREFACE

In recent years health educators have increasingly recognized the potential of systematic evaluation as a means to both appraise and improve their programs. For this potential to be realized, however, an effective mechanism for gathering relevant data is required. Until now, there have been instances where critical information about a program's effects has not been collected because of a lack of suitable measuring devices for gauging program effects. This handbook was prepared to rectify, at least in part, this deficiency in the evaluation of physical fitness and exercise education programs.

More specifically, in 1980 the United States Centers for Disease Control (CDC) initiated a project to prepare seven collections of measuring devices which could be used by health educators to evaluate their programs. The measures were to be assembled in handbooks which would serve as resources for those wishing to evaluate health education programs in the various fields.[1] The materials contained in the following pages constitute the handbook of evaluation measures for the field of exercise.

In essence, the project's architects hoped to provide health educators with a range of measurement devices that could serve as possible tools for the evaluation of a particular program. This "menu" of potentially relevant assessment instruments was expected to facilitate the assembly of evidence regarding a given program's effects.

This handbook is not intended to be prescriptive. Those involved in evaluating exercise programs should regard the handbook only as a resource, that is, a repository of assessment tools which may be of use. The extent to which the handbook is actually useful depends, in large part, on the extent to which there is a correspondence between the intended impact of a given health education program and the outcomes which are assessed by the measures in the handbook.

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[1] The seven handbooks focused on the following areas: alcohol and substance abuse, diabetes, exercise, immunization, nutrition, smoking, and stress management. Information regarding the availability of the handbooks is available from the Centers for Disease Control.

A Capsule History of the Handbook's Creation

The development of this handbook was conducted by an external contractor, selected competitively on the basis of responses to a CDC-issued request for proposals. The contractor was to collect and develop evaluation measures for critical behavioral, knowledge, skill, and affective outcomes in the area of exercise and physical fitness. A panel of experts was selected to guide the contractor in determining which outcomes were important enough to exercise programs to require assessment devices. Three members of the panel were subject matter specialists. These experts were selected on the basis of suggestions from prominent national associations with a primary mission in exercise. Nominations were screened to ensure the creation of a panel with a balanced view of the field. So, for example, at least one of the experts represented a national association and at least one possessed direct community level experience in administering local health education programs in exercise.

In addition to these three subject matter experts, a fourth member of the expert panel was a health education generalist. Nominations for the health educator were solicited from national health education associations. Two specialists in evaluation and testing were also members of the expert panel. Additional subject matter experts representing interested national associations were also invited to serve as panelists. The names and affiliations of the expert panelists in exercise are provided at the end of the Preface.

The expert panelists met for two days during mid-1981 in order to isolate the chief outcomes which health education programs in the field of exercise could be expected to promote. After intensive deliberations, preliminary statements reflecting such outcomes were isolated, then set in priority order by the subject matter and health education experts. The evaluation and testing specialists did not participate in this setting of priorities.

The preliminary outcome statements selected by the panel were subsequently refined by the contractor's staff, then mailed to panelists as well as other interested individuals and organizations, all of whom rated the importance of each possible outcome statement. The prioritized list of outcomes that resulted was used to guide the selection and development of measures for this handbook. All newly-developed measures, along with the formal test specifications which were used to prepare them, were reviewed via mail by each panelist. In addition, many of the new measures were piloted on samples of approximately nine individuals. Feedback from these tryouts and the panelists' review was used to revise

the new instruments. All of the new measures were also systematically reviewed by members of the contractor's staff in an effort to eliminate any potential sex, race, religious, or socio-economic bias.

While the new measures were being developed, a comprehensive search was conducted to locate existing measures which might match the panel-identified outcomes. The content of all these measures was carefully reviewed to ascertain its match with one or more of the panel-identified outcomes. All existing measures which corresponded to an outcome statement were then reviewed to ensure that they possessed no major technical or psychometric flaws which rendered them unsuitable for program evaluation use. Wherever there was substantial duplication among two or more existing measures, the measure which possessed the strongest supporting psychometric data, or the measure that was clearest and easiest to use, was chosen. All the existing measures which passed both the content screening and the subsequent reviews are included in this handbook.

The Handbook's Contents

There are several sections in the handbook, beginning with this Preface, which is largely an introductory elaboration of the handbook's origin and contents. The handbook's major sections are described below.

Chapter One contains a review of the fundamentals of systematic evaluation as applied to the appraisal of health education programs. Because the handbook will be used by experienced evaluators as well as by health educators with less evaluation background, it is possible that Chapter One's account of program evaluation will be of more interest to some handbook users than to others. Individuals using this handbook can decide whether their conversance with the basics of program evaluation permits them to skim Chapter One or skip it entirely.

Chapter Two describes the nature of the measures included in the handbook. The four different categories of measures found in the handbook are explained, and the interrelationships among these measurement categories are described. The rationale behind the types of measures newly developed for the project is presented. The procedures employed by project staff in locating and screening existing measures are also described.

Chapter Three provides guidelines for using the measures in program evaluation. Included in this chapter are practical suggestions regarding such matters as the selection, administration, and scoring of the handbook's measures.

Chapter Four lists the outcomes identified by the expert panel. The outcomes are presented in their amplified form, and each one is annotated to indicate where in the handbook the newly-developed and/or previously existing measures for that outcome can be found.

In Chapter Five the new measures constructed specifically for this project are presented. All of these new assessment devices are criterion-referenced measures. To facilitate use of the measures, each is preceded by a descriptor page which supplies the title of the measure, the title of the outcome for which the measure was created, and the characteristics of the population with whom the measure is to be used. This descriptor page also presents a brief general description of the measure. It must be stressed that these new measures have not yet been subjected to empirical verification, hence should be regarded as assessment devices whose technical qualities have not yet been verified.

Chapter Six contains the existing measures which were identified as corresponding with panel-approved outcomes. Each measure is preceded by a descriptor page which includes the measure's title, its authors, the type of outcome assessed, and the title of the outcome statement to which the measure corresponds. In addition, a brief description of the measure is provided, along with a summary of relevant information regarding the measure.

To facilitate photocopying and reproduction of the measures in Chapters Five and Six, all descriptive and scoring information has been placed on separate pages. The measures themselves can be readily copied and reproduced by health educators. Handbook users have permission to use all the measures in this collection for health education program evaluation, without needing to seek further permission from any authors or agencies.

In Chapter Seven the test specifications for Chapter Five's new measures are presented. These specifications consist of the rules and content constraints used to generate all new measures for the project. Each set of specifications constitutes the most complete description of the measure for which it served as the blueprint. A complete understanding of Chapter Five's measures is possible only by reviewing Chapter Seven's specifications.

An annotated evaluation bibliography is presented after Chapter Seven, to provide follow-up reading for handbook users who wish to deal at greater length with the topics developed in Chapters One through Three. The annotated descriptions should make it possible for readers to determine whether the cited reference is appropriate for their purposes.

The handbook is concluded with an Index of Measures. This index lists, by title, all of the program evaluation measures contained in this book.

Acknowledgment of Contributors

The following individuals served as expert panelists for this handbook:

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The project which resulted in the creation of this handbook was funded by the Centers for Disease Control in Atlanta, Georgia. The project was initiated by the Research and Evaluation Staff, Health Education Division, of the Center for Health Promotion and Education. Dr. Walter J. Gunn, chief of that group, conceptualized the project, set forth its specifications, and supplied technical guidance throughout the project's existence. The project was originally conceived during conversations between Dr. Gunn and

Dr. Carol D'Onofrio of the University of California, Berkeley School of Public Health. Throughout the project, those serving as project officers were Dr. Gunn and Dr. Diane Orenstein of the Centers for Disease Control and Dr. Donald Iverson and Dr. Patricia Mullen of the Office of Health Information and Promotion, Office of the Assistant Secretary for Health, Department of Health and Human Services. The project has substantially benefited from the continuing technical counsel of its project officers.

The handbook itself was developed by the following members of the staff of the IOX Assessment Associates: Eloise Appel, Carol Bloomquist, Phyllis Jacobson, Rebecca Jaramillo, Elaine Lindheim, W. James Popham, Celia Rodrigo, and Elanna Yalow. Robin Harte and Cecilia Marcelino prepared all of the handbook text. Numerous health educators also offered counsel regarding the handbook's measures and introductory materials. Without their expert assistance, development of this volume would have been impossible.

CHAPTER ONE

PROGRAM EVALUATION CONSIDERATIONS FOR HEALTH EDUCATORS[1]

The development of strategies which might prove successful for program evaluation has received substantial attention in recent years. Many of the recommended approaches to program evaluation have been formally designated as evaluation "models," that is, systematic conceptualizations of the step-by-step manner in which evaluations should proceed. Some approaches emphasize the effects of a program. Others focus on the quality of a program's procedures. Still others primarily attend to the costs associated with a program. Because evaluators now have numerous evaluation approaches from which to choose, today's health educators can select those aspects from the various evaluation models which will prove most serviceable for a given evaluation assignment.

The purpose of this chapter, therefore, will not be to present a particular evaluation model, but rather to focus on considerations central to all evaluations. We evaluate programs in order to find out if they are working and how to make them work better. Sometimes a program evaluation is conducted by an individual not affiliated with the program itself--an individual formally designated as a program evaluator. Far more frequently, a program evaluation is carried out by the program personnel who are actually operating the program. In such instances these health educators simply change roles for a while, exchanging their program implementation responsibilities for program evaluation responsibilities. Thus, whenever the term "evaluator" is used

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[1] In this introductory chapter an attempt will be made to present a series of salient considerations related to the evaluation of health education programs. But, clearly, it is impossible in a single chapter to discuss all evaluation topics with adequate depth. Hence, a set of references for further reading has been provided. This evaluation bibliography, which has been annotated to provide a general description of each volume's contents, can be found on pages 262-269. Throughout the handbook's early chapters, the reader will be directed to various of these references for further information about the topics being discussed.

in these introductory chapters, it refers both to the evaluator specialist and to the program staff member serving as evaluator.

Focusing the Evaluation

Effective evaluations help people make better decisions about programs. Anyone setting out to evaluate an exercise program, therefore, should be certain to focus the evaluation on the sorts of decisions that are likely to be at issue. This includes getting a clear idea about the purpose(s) of the evaluation as well as identifying the individual(s) or group(s) who will use the evaluation's results.

The nature of the program being evaluated makes a substantial difference in an evaluation's focus. Some programs are carried out chiefly to develop and refine the program itself. We can refer to these programs as experimental programs in the sense that they are programs of yet unproven effectiveness. In evaluation studies of experimental programs there is an attempt to isolate the most effective program or the most effective program components. Another type of program is a demonstration program, that is, a program in which proven approaches are offered in an effort to secure support or adoption from a larger clientele. Demonstration programs, then, are targeted toward two audiences, the program's participants and the individuals or groups whom the demonstration is supposed to convince. When evaluating demonstration programs, we often attempt to verify whether a program has been disseminated with fidelity to its original conception or, if not, why. Finally, there are service programs in which proven approaches are offered in an attempt to improve the health and well-being of designated target groups. In such programs evaluation often takes the form of monitoring. Two or more of these three types of programs can, of course, be provided in combination.[2]

Differences exist in the evaluation activities depending on the purpose of the evaluation, the type of program being evaluated, and the nature of the decision-makers for whom the evaluation is being conducted. Too many times program personnel avoid evaluation on the grounds that theirs is only a demonstration program and, hence, needs no systematic

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[2] For an extended consideration of these three types of programs, see Gunn, W. J. Evaluation: Proving and improving your programs. A paper presented at the Fifth International Conference on Health Education, London, September, 1979.

appraisal. Or, again, those carrying out a service program might fail to evaluate their efforts because, "after all, we are merely disseminating a proven methodology." But program evaluation is needed for all three kinds of programs. The issue is not whether, but how.

Objectives and evaluation. Exercise programs come into existence in order to bring about worthwhile effects. Most exercise programs, therefore, are organized more or less systematically around some form of program objectives. The more explicitly these objectives are formulated, the more useful they are in carrying out evaluations. Indeed, one consideration in conducting an evaluation is the extent to which a program's objectives have been achieved. It is for this reason that evaluators often work with program personnel in an effort to have those individuals create objectives which describe the desired post-program behaviors (including performance on measuring devices) of program participants.

Too often program designers describe their objectives in such lofty and loose language that it is next to impossible for evaluators, even after the program is over, to tell whether the objectives have been attained.

There is substantially more to program evaluation than merely discerning whether a program's goals have been achieved. For example, there may be program effects, both positive and negative, which although profound were not anticipated in the program's stated objectives. In addition, there is the quality of the objectives themselves. Perhaps the program's goals are truly trivial. A skillful evaluator can profitably work with program personnel to improve the nature of their aspirations. Clarified and more defensible objectives can be a boon to both program personnel and evaluators.

Summative and Formative Functions. Since the expressions "formative evaluation" and "summative evaluation" were introduced over a decade ago, considerable attention has been given to the virtues of each type of evaluation study. In the late sixties and early seventies, a good many evaluators were persuaded of the virtues of summative studies in gauging a program's overall effectiveness. To their distress, however, it often turned out that definitive judgments were difficult to achieve. Rarely did a summative evaluation study settle conclusively whether a given program was sufficiently meritorious to make a go/no-go decision on the basis of that study alone. More often than not, a host of complicating elements proved far more influential in the nature of the final decision than the results of an evaluation study.

As a consequence, it became increasingly clear that, in many instances, formative evaluation studies might prove useful. Formative evaluation is not end-of-the-line evaluation. Rather, such evaluation is an ongoing endeavor as the program is designed, installed, and maintained. Whereas summative evaluation's mission is to provide a final judgment of a program's overall merit, formative evaluation's mission is, on a continuing basis, to bolster a program's quality. The effective formative evaluator functions less as an external judge and more as a collaborator, a member of the team whose task it is to monitor the program in order to improve its quality and the decisions regarding it.

These two evaluative roles are not mutually exclusive. An evaluator's main task is to collect information which is maximally useful in improving the quality of decisions made about programs. Evaluation should identify the areas in which a program is having an impact, as well as those in which it is not. Effective components can then be retained; ineffective components can be strengthened or dropped. A mechanism for the systematic collection of information regarding exercise programs can provide a solid data base for the continuing refinement of such programs and for improvement in the general level of services provided.

Conducting Evaluation Studies

How can evaluations be conducted so as to achieve their maximum benefits? It is sometimes thougnt that program evaluations must include complicated and elaborate data-gathering designs in order to yield a decisive and compelling set of data. This is simply not the case. Program personnel and evaluators should strive to conduct their studies and gather data in such a way that the ambiguity of results can be kept to a minimum. That is, evaluations must attempt to determine whether a program works, what makes a program work, or what prevents it from working. Evaluation data-gathering designs serve as the means to this end by delimiting the procedures that will be used to explore the workings and impact of a program.

The conditions under which we gather data will permit us to make inferences about a program's overall impact on participants or, perhaps, the differential effectiveness of the program's various components. To select optimal designs for their investigations, evaluators must have a broad knowledge of the available design alternatives and the strengths and weaknesses associated with each. Evaluators must also work closely with program staff to determine which decision options can actually be illuminated by evaluation studies. The most sensible evaluation study for a given context can then be planned.

Rights of Human Subjects.[3] Exercise programs are designed to improve individuals' health and well-being. When we evaluate those programs, therefore, we characteristically focus on the impact of the programs on human beings. Some evaluators, however, become so caught up with the importance of appraising a program that they overlook the rights of the individuals being evaluated.

Above all, the evaluator should be guided by a respect for human dignity, hence should not engage in evaluative activities which in any way demean an individual's rights. Prominent among the principles which should guide evaluators is that of informed consent. The principle of informed consent requires that an evaluator secure, in advance of the study, agreement of all participants in an investigation. This consent is obtained after the potential participants have learned about the nature of the investigation, at least insofar as their participation is involved. This principle properly reflects the evaluator's concern for human dignity, since it rules out the possibility of making individuals serve, unknowingly, as subjects in an evaluation.

A key tenet in most ethical codes regarding human subjects insists on the confidentiality of all participant data gathered as a consequence of an investigation. Because the evaluator is not concerned with an appraisal of individual learners but rather with the worth of programs, the principle of participant confidentiality usually poses no problems. Evaluators must be careful, however, to devise protective safeguards, such as anonymous completion of forms and careful handling of data, that ensure the confidentiality of the data.

Internal and external validity.[4] Characteristically, an evaluation examines a program's effects in order to determine whether individuals have changed as a result of their participation in the program. The pivotal issue here is whether any observed changes in the status of participants can be attributed to the program. Could other factors such as participant maturation, familiarity with the measures used in the evaluation (testing), or external influences such as a mass media campaign (history), account for the observed changes? An ideal data-gathering design helps rule out viable explanations, other than the program, for measured

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[3] For additional information about the rights of human subjects and the ethics of evaluation, see Annotated References Nos. 1, 21, and 30.

[4] For additional information about internal and external validity issues, see Annotated References Nos. 6, 9, and 10.

effects. Such a design deals with the issue of internal validity and addresses the question of whether observed effects can be attributed, with confidence, to the program. Threats to internal validity weaken our ability to attribute the effects that were observed to the program and not other factors.

Another important issue is the external validity of evaluation studies. Can the findings from a specific evaluation be generalized to the next group of participants or to variations of the program (e.g., to a similar physical education program in a different school or to the same program held during the following year?) Could we expect the program to have an impact in other settings or at other times? What would be the effects with different participants, modes of presentation, or program personnel? External validity focuses on the need to demonstrate that the observed program effects can be expected to occur under conditions other than the specific instance of the program being evaluated. With external validity, evaluations can serve as more than tributes to successful programs or postmortems for unsuccessful ones by providing useful information as program personnel look to the future.

It is important to distinguish between internal and external validity, for different information may be required to establish each one. A procedure that increases internal validity may weaken external validity. Experimental control, which enhances internal validity, must be weighed against feasibility and generalizability. Evaluators must try to balance the problems associated with threats to internal and external validity, by selecting a data-gathering design that best addresses the information needs of the program and allocating evaluation resources accordingly. These priorities must come from the context of the program itself, since there are instances in which an evaluator should stress one type of validity rather than the other. Emphases on internal or external validity will vary as a function of the program decisions to be made.

Design options.[5] The key to selecting an appropriate evaluation design is to pick the one that best deals with the needs of those involved with a program, such as the program's staff, participants, or funding agency. In some instances, physical educators may be interested in the effects of the particular program that they are providing. "Will participants exercise regularly after attending this program?" In other instances, educators may be trying to

[5] For additional information about evaluation design options, see Annotated References Nos. 6, 9, and 17.

develop model programs that will subsequently be disseminated locally or even nationally. "Can we develop a program that will encourage individuals to exercise regularly, whether they are teenagers in Duluth, working mothers in Tampa, or retired business executives in New Haven?" An evaluator would have to design very different studies in order to answer these fundamentally different questions. As indicated earlier, evaluators must design their studies so that they serve the specific purposes of that evaluation. There is no such thing as a general-purpose evaluation.

An understanding of a few basic principles can help evaluators select designs well suited to their needs and, perhaps more importantly, determine the limitations of whatever design is implemented. No evaluation study will be perfect. Every study leaves some questions unanswered. Evaluators need to be clear regarding what they have learned about a program and the degree of certainty associated with their findings, then convey this information to other interested audiences.

To illustrate some of the major considerations in selecting data-gathering designs, consider a six-month health education program aimed at modifying Behavior X. If participants' status on Behavior X were measured at the close of the program, we could represent that situation schematically as follows:

Program ⟶ Measurement

If this were the design employed, what could you tell about the program's impact on participants' behaviors? Using such a design, how confident would you be that the participants' reported behavior changes were attributable to the program?

It would be difficult to attribute definitively any change in behaviors to the program. The program, indeed, may have been totally ineffectual, and participants' post-program behaviors might be identical to those they possessed before the program. The measurement process might be detecting behavioral patterns that participants brought to the program, not those that were affected by the program. Because we have no measure of behaviors prior to the program, we can't distinguish between preexisting behaviors and program effects. Hence, with this data-gathering design, it may be impossible to discern the influence of the program.

But even with such a basic data-gathering design it may be possible to secure meaningful program evaluation data. Suppose, for example, that an exercise program is promoting a knowledge outcome so advanced that you expect participants will not be familiar with its content. In that setting one could assume that any post-program knowledge is attributable to the program's impact, because participants would probably not know the information without the program. It might well not be worth the resources necessary to demonstrate conclusively that participants began the program unfamiliar with the outcome's content.

These examples illustrate the chief mission of data-gathering designs, namely, to rule out plausible rival hypotheses, other than the program's impact, that might account for the post-program status of participants. If there is reason to believe that participants' pre-program status may account for their post-program status, then a data-gathering design should be selected which permits the evaluator to rule out that rival hypothesis.

Now suppose that, in order to avoid the major shortcoming of the previous design, we measure participants' behavior both before and after an exercise program. We could represent that design as follows:

Measurement ⟶ Program ⟶ Measurement

Let's assume that the result was a substantial shift toward more desirable behaviors between the initial and the final measurement. Could this change in behaviors be ascribed to the program? We cannot be sure. There are many other factors that may have led to the observed change in behaviors. For example, there may have been a significant event, an event totally unrelated to the program, which influenced participants' behaviors. If the program were designed for children, it may have been that the participants matured during the time frame of the program. Thus it may have been increased maturity rather than the program which caused the altered behaviors. The program itself may have contributed nothing to the shift of behaviors.

But, as was true with the earlier design, if the rival plausible hypotheses for explaining posttest results are accounted for satisfactorily by this data-gathering design, then it is sufficient for the task at hand. In fact, many formative evaluations feature such simple yet serviceable

pretest-to-posttest designs involving only one group of participants.[6]

We can eliminate some of the more common rival explanatory hypotheses by using a data-gathering design in which we employ a comparison or control group. The use of a control group (untreated individuals) or comparison group (individuals receiving a different program) can be illustrated as follows:

Group 1: Measurement ⟶ Program ⟶ Measurement

Group 2: Measurement ⟶ Measurement

In this design, as we see, a control group (Group 2) is assessed before and after the program, but this group never receives the program itself. Under such circumstances we can be more confident that if the program participants' pre-to-post behaviors shift, and the control group's pre-to-post behaviors remain the same, the program caused the shift.

There are, however, some disadvantages to this design. It may be that the initial measurement was reactive. A reactive measurement is one which by itself, or in concert with the program, influences participants' behavior. Attitude inventories and self-report questionnaires about behavioral practices are often reactive. Suppose that in this case the pre-program instrument alerted participants to what was to be measured, hence influenced their performance on the second measurement. In addition, measurement is expensive, and measuring control groups can be a relative waste of valuable evaluation resources. Time and money can often be better spent studying the program being evaluated rather than studying a no-treatment control group of little interest. (The merits of comparative designs will be described later.) Evaluators should not ritualistically employ control groups in their designs if the question at issue can be answered without their use.

There are situations in which health educators may wish to appraise the effects of their programs on the basis of routinely administered measurements, such as periodically

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[6] Note that this design requires measurement before as well as after a program. This points to a commonly accepted but often overlooked principle of effective evaluation. Evaluation is most effective when it is initiated at the beginning of a program, often prior to the program's formal inception. If evaluators are not called in until the end of a program, they sometimes serve as little more than test proctors.

administered questionnaires or the kinds of archival data one often finds recorded in health agencies. For instance, suppose we were evaluating a "parent health awareness" program and were interested in the number of checkups from physicians sought by parents of infants. Assuming that such information is available in the county health department's records, the evaluator may wish to employ a time-series design. In a time-series design we measure at periodic intervals both before and after the program. By observing the pattern of measurements prior to and following the program we can discern if the program had any effect.

To clarify, Figure 1.1 presents three illustrative time-series data patterns of six periodic measurements (M_1 through

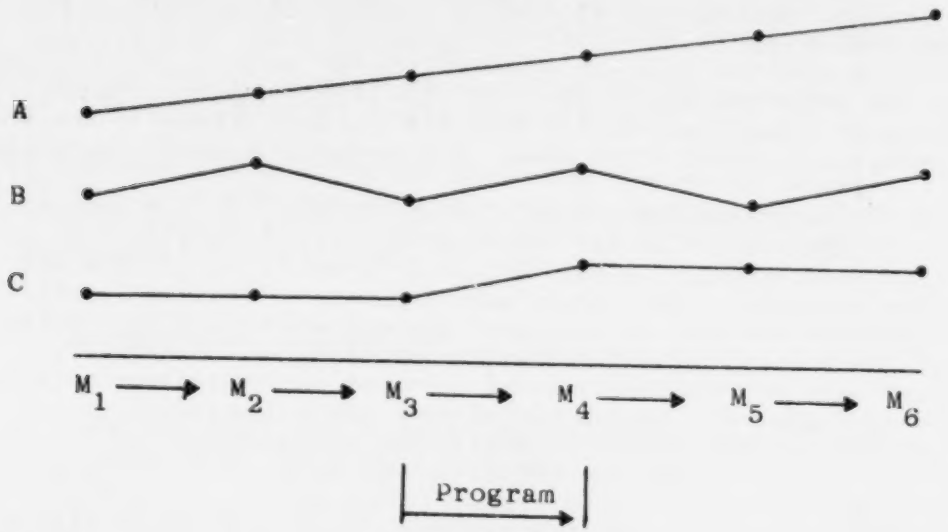

Figure 1.1. Three data patterns from a time-series design.

M_6) taken every two months over a 10-month period. A two-month health education program is offered midway in the time series, that is, immediately following Measurement Number Three (M_3) and just before Measurement Number Four (M_4). Note that the difference between M_3 and M_4 (that is, immediately before and after the program) is identical in all three data patterns. Yet in data patterns A and B we would be reluctant to attribute the M_3 to M_4 growth to the program's effects. In pattern A there are consistent increments over the entire 10-month period, not just the period associated with the program. In pattern B the increments and decrements fluctuate too much. Only in data pattern C could we make the attribution of program effects with some confidence. Although the data analysis procedures associated with time-

series designs are fairly complicated, it is often possible to discern program effects merely from inspections of patterns in plotted data such as those shown in Figure 1.1.

In using time-series designs to evaluate programs, evaluators must be particularly attentive to the possible contaminating impact of an event, external to the program, that may have influenced the observed data patterns. For instance, referring back to Figure 1.1, suppose that a widely publicized national outbreak of influenza had occurred at the same time that the "parent health awareness" program was being offered. Suppose also that parents were being urged by the media to seek checkups for their infants. Then the growth pattern observed in pattern C might be more associated with that event's effects than with the health education program's effects.

A time-series design, though often used with archival data, can be employed with any sort of periodically gathered data such as routinely administered attitude inventories. A time-series design can be applied to evaluate one program at a time or to evaluate several programs simultaneously. For example, suppose the three data patterns seen in Figure 1.1 were data associated with simultaneously offered programs. In this instance the program yielding data pattern C would be the only one resulting in detectable effects.

In utilizing time-series designs one must be certain to have a reasonable number of measurement opportunities over an extended time period. That is, one would not want to employ such a design unless clear data patterns were possible to discern.

Randomization[7]

In the designs we have discussed thus far, the focus has been on evaluating one program with one group of participants. This may be the situation for many physical educators who are only interested in considering the specific program they are providing. But suppose, as we described earlier, you are interested in the general effectiveness of a program which will serve as a model to be implemented in a variety of settings, with different types of participants. How would you design such a study?

One technique that can prove useful in such settings is randomization. We select or assign things randomly when we do so in a nonsystematic manner, such as by using a table

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[7] For additional information about randomization, see Annotated References Nos. 6 and 19.

of random numbers (found in most statistics texts). When the participants taking part in the program to be evaluated have been selected at random from a larger population of potential participants, then we can be reasonably confident that those involved in the evaluation will be representative of that larger population. There is less likelihood that the participants being studied in the evaluation are atypical, hence inappropriate subjects to include in the study.

This sort of randomized selection of subjects is particularly important when we wish to generalize from the results of our study to a larger population. This procedure may also be useful when there are more applicants than vacancies for a program or when not all potential clients can be served.

Another use of randomization arises when we determine which of several programs individuals are to receive. If we want to compare the effects of different programs, then we want to be as equivalent as possible. To this end we can employ a randomized assignment procedure whereby we randomly place individuals in the programs to be compared.

The two procedures of randomized selection and randomized assignment are illustrated in Figure 1.2. Note that we randomly select participants for programs from the pool of potential participants, then randomly assign those individuals selected to either Program A or Program B.

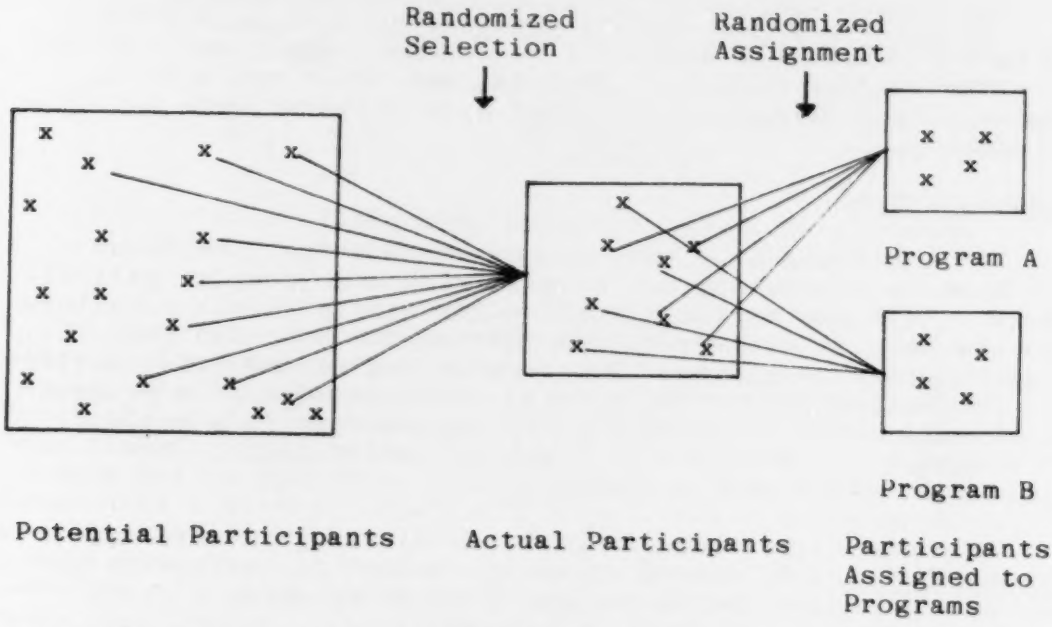

Figure 1.2. Randomized selection of participants from pool of potential participants and randomized assignment of participants to programs.

In actual practice, of course, program personnel often do not have the luxury of constituting groups via randomized selection or assignment, and there are in fact situations where program personnel would not want to use such procedures. As a consequence, we are frequently obliged to use evaluation designs that can help disentangle program effects from pre-existing differences either between participants in different programs or between participants and nonparticipants in the same program. Program evaluators should become conversant with such comparative designs and the settings in which they should be used, in order to select a design that will be most effective in forestalling the likelihood that factors other than the program itself accounted for participants' post-program status. Design selection must always be tempered by practical constraints such as available financial resources and the acceptability to program sponsors and participants of randomization techniques.

Comparative designs. The use of comparative designs also can prove helpful in the effort to come up with meaningful data. Comparative designs, in fact, arise because of the basic function of evaluators, namely, to aid decision-makers. Decision-makers ordinarily make selections among alternative courses of action. Ideally, if a decision-maker is choosing between two options, the evaluator should supply evidence as to the merits of each option. For this reason, in designing evaluation studies it is often less sensible to include an untreated control group than to include comparison groups representing the various options under consideration.

For example, suppose that a program developer for an exercise program were choosing between two ways of presenting program content. If possible, the evaluator would consult the research literature regarding the probable virtues of each option. Thereafter a study could be designed in which both strategies, or variations of both strategies, were tried out for a reasonable period of time in order to compare the relative effectiveness of various approaches. In this situation there would be little reason to employ an untreated control group, because it is unlikely that a no-treatment option would be chosen by the program staff.

The data-gathering designs treated here have been relatively simple. There are, however, a number of far more complex designs than we have considered. Inexperienced program evaluators sometimes become so entranced with complicated data-gathering designs that they compulsively apply them whenever carrying out an evaluation study. But evaluators do not need to employ excessively complicated designs. There are innumerable instances when simple data-gathering designs are sufficient.

This is particularly true in formative studies when evaluators are looking for rapid-turnaround data to guide program personnel in making upcoming program decisions. In such settings the evaluator needs to assemble timely decision-relevant information. The use of complex data-gathering designs may, in such circumstances, represent a squandering of evaluation resources. Only when complex designs are needed to eradicate threats to internal or external validity should they be adopted.

Program evaluators frequently also are so concerned about detecting the effects of programs that they fail to consider the costs needed for the programs to produce those effects. Yet decision-makers need guidance regarding not only the results they can expect from a program, but also the financial resources required to achieve those results. For this reason program evaluators should consider the relative costs of programs. To illustrate, how much does it cost Program A to produce a given result in relationship to how much it costs Program B to produce comparable results? Judgments about a program's impact in the absence of considerations about its costs are potentially superficial.

Criterion-Referenced Measurement[8]

Although there are various approaches to program evaluation and each has its own special emphases, there is one common feature of nearly all evaluation approaches. That common feature is the use of systematic evidence regarding a program's effects. To secure evidence of program effects, we characteristically employ measurement instruments. But some instruments are far more suitable for assessing a program's effects than others.

For more than a decade, educational measurement specialists have directed their attention toward an emerging form of assessment known as criterion-referenced measurement. Whereas norm-referenced measurement attempts to ascertain examinees' status in relationship to other examinees, criterion-referenced measurement attempts to ascertain examinees' status in relationship to a clearly defined set of behaviors. In fact, it is because the performances of examinees are interpreted according to a clearly defined domain of criterion behaviors that we say a measure is "referenced" to those criterion behaviors, hence classified as a criterion-referenced measure.

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[8] For additional information about the nature and development of criterion-referenced measures, see References Nos. 4, 18, and 27.

The essence of a criterion-referenced instrument is the clarity with which it describes that which is being measured. Because norm-referenced instruments are relative measures, emphasizing relative comparisons among examinees, they often do not provide a clear description of exactly what it is they are assessing. In contrast, because criterion-referenced instruments are absolute measures, designed to determine exactly what it is that examinees can or cannot do, independent of the performance of other examinees, they should provide an unequivocal description of what they are measuring.

It is this clarity regarding the attributes that they assess that renders criterion-referenced measures ideal for program evaluation. Consistent with the spirit of providing useful information for decision-makers, criterion-referenced instruments describe, with precision, the nature of what is being measured. Hence, when criterion-referenced measures are used in a program evaluation, decision-makers can readily interpret the evidence being supplied.

The best way to describe what a particular criterion-referenced instrument measures is via the test specifications which are developed to generate the items on that measure. Test specifications identify the particular rules and content limits used in constructing a measure. The test specifications operationalize the attributes which are being assessed by delimiting the eligible content and format of the measure.

As with any assessment strategy, there are varying degrees of quality in criterion-referenced measures. Not every instrument described as "criterion-referenced" truly deserves that label. Evaluators of health education programs, therefore, should become knowledgeable regarding the characteristics of high quality criterion-referenced measures. Several dimensions of a properly constructed criterion-referenced instrument are described below.

Clarified descriptions. The single most important element of a properly constructed criterion-referenced instrument is that it adequately describes the attributes it claims to measure. That description, contained in the test specifications, may take a variety of forms. Irrespective of the particular scheme employed, when one reads the descriptive information associated with a criterion-referenced instrument, it must be possible to discern unambiguously what is being measured. By inspecting the test specifications in Chapter Seven the reader can get an idea of the level of descriptive rigor required by criterion-referenced tests.

A manageable number of attributes. Historically, many measures have attempted to cover vast arrays of content. The

net effect of this broad coverage has often been that those attempting to use the results from such instruments become overwhelmed by the profusion of discrete attributes being assessed. A properly constructed criterion-referenced instrument will focus on a limited number of dimensions. As a consequence, program personnel can direct their efforts toward those dimensions and evaluators can describe program effects along those dimensions. A criterion-referenced instrument that attempts to measure 10 or 20 discrete outcomes, for example, would likely prove less useful to program personnel and evaluators than an instrument which measures only one significant attribute. In some instances, particularly for diagnostic purposes, it may be helpful to design an instrument that assesses the major subdimensions of a more general attribute. Even in such cases, however, the guiding rule should be to employ only a manageable number of categories.

An adequate number of items per measured attribute. In order for a measure to yield adequate information about examinees' status regarding a given attribute, it is useful to provide multiple instances for examinees to display that attribute. Hence, criterion-referenced measures should provide a reasonable number of test items for the attributes that they measure. It is probably insufficient to attempt to measure a cognitive or affective attribute with one or two test items only. In some cases, a handful of test items per measured attribute or its subdimensions can aid the evaluator in gaining rough estimates of certain program effects. But, generally speaking, at least five to ten items per attribute typically constitute a minimum for measuring significant knowledge, skill, and affective outcomes in the health field.

Reliability.[9] Criterion-referenced instruments, just as norm-referenced instruments, must measure whatever they are measuring with consistency. The consistency with which an instrument measures is known as its reliability. To illustrate, suppose a 30-question knowledge test is administered on a given day, then re-administered to the same examinees five days later, with no intervening instruction. If the test is reliable, we would expect examinees to receive essentially the same scores on both testing occasions. If the test, when re-administered, yields substantially different examinee scores, we know that the test is not measuring with consistency, forcing us to conclude that it is unreliable.

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[9] For additional information about determining the reliability of measuring instruments, see Annotated References Nos. 2, 15, and 27.

There are several different kinds of reliability indices which can be calculated to reflect the consistency with which a given instrument measures, for example, test-retest or equivalent forms reliability. The kind of reliability data needed to appraise a measure for possible use in an evaluation study should be in accord with the way the measure will be used in the study. If a measure is to be used on a test-retest basis in an evaluation, for example, then information about that type of reliability is germane.

All reliability coefficients range from 0 to 1.0, with coefficients of .80 or higher indicating highly reliable measures. Although space limitations preclude a more complete discussion of reliability, evaluators need to become conversant with this key attribute of properly constructed tests. At this point, it must suffice to alert program evaluators to the importance of securing evidence regarding the reliability of any measure to be used in an evaluation study.

Validity.[10] An imperative attribute of a properly constructed measure is that it be valid. An instrument is valid if it measures what it purports to measure. To illustrate, in the health field we often use self-report measures as a way of finding out about individuals' "real life" behaviors. If our self-report inventories are valid, then those measures will secure responses which are accurate indicators of the way that respondents actually behave. To the extent that responses on the self-report measures do not coincide with respondents' actual behaviors, then the measures are invalid.

There are several varieties of validity studies, each yielding somewhat different but conceptually related sorts of evidence about a measure. For example, one approach to validity arises when we use self-report measures as proxies for physiologic measures, such as when we use self-report questionnaires to elicit an account of participants' health behaviors, then attempt to correlate the questionnaire responses with the results of physiologic tests that reveal something about people's actual behavior. If the questionnaire data do, in fact, correlate substantially with the physiologic measures, then the questionnaire is, at least to some extent, validated.

Another approach to validity arises when we use measures as predictors of some subsequent criterion behavior, such as when we try to use responses to an affective inventory

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[10] For additional information about determining the validity of measuring instruments, see Annotated References Nos. 2, 15, and 27.

gauging one's intention to exercise regularly as a predictor of individuals' later exercise patterns. If the affective measure does, in fact, correlate substantially with subsequent observations of the exercise behavior, then evidence of the measure's validity has been obtained.

Absence of bias.[11] In the past decade or two we have become sensitized to the distressing truth that many educational assessment devices contain items which are biased against particular subgroups such as ethnic minorities and women. An example of a biased test item would be a knowledge question which, because of peculiarities in its content or its wording, is more difficult for lower-income examinees to understand and answer correctly. Test items which use content and terminology apt to be known only by the affluent would certainly be biased against the less economically advantaged.

Other sorts of bias which can adversely influence examinees' performances arise when test items are offensive to particular groups of individuals. For example, if test items include content that is seen to be derisive to women or to members of particular ethnic groups, then examinees from those groups are not apt to perform at their best on such items because agitation over the offensive content may interfere with their responses to the items.

A properly developed measure will pay adequate heed to the avoidance of biased items. There are now available both judgmental and empirical techniques for detecting the presence of biased items in measures. One or both approaches should be used to determine the degree of bias in criterion-referenced test items.

In reviewing the various dimensions of a properly constructed criterion-referenced measure, it is important to note that any given instrument may not possess all these qualities. Often one must choose among measures which embody some but not all of these elements. The important point is that merely because a measure is labeled as criterion-referenced does not indicate that it is of sufficient quality to be used with satisfaction in evaluating a health education program. Further scrutiny of the measure's quality is mandatory.

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[11] For additional information about methods for avoiding test bias, see Annotated References Nos. 5 and 25.

Sampling Considerations for Data Collection[12]

The data-gathering requirements of evaluation can, if evaluators are not attentive, become a disruptive and burdensome intrusion into ongoing programs. Accordingly, skillful evaluators should restrict their data-gathering forays to the least intrusive form possible.

One way to minimize an evaluation's intrusiveness is through sampling. Although most people are familiar with the form of sampling that involves selecting some individuals from larger populations of individuals, it is also possible to sample items[13] when administering program evaluation measures.

To estimate how a large group of people would respond on a particular measure, it is not necessary to administer that instrument to all the individuals in the group. Instead, we can sample individuals from the group by selecting either a simple random sample or a random sample stratified on the basis of program-relevant factors such as age, sex, and socioeconomic status. Assuming that the sample is correctly drawn, we can estimate the status of the total group based on the responses of this sample.

In the version of sampling described above, we select representative samples of people to represent a larger population. Suppose, for example, that an evaluator has a measure that is to be used to determine program effects. Assuming a reasonably large number of program participants, say 50 or so, we could randomly administer the measure to one half the participants only. In essence, this approach allows us to infer how the total group of participants would score on the measure although only half of the participants completed it. We could thus estimate how the total group of participants would have responded, yet halve the amount of participant time required for data-gathering.

In a similar sampling procedure, we could administer two or more measures at once. Suppose that two measures, Inventory X and Inventory Y, are to be given to program participants. We can randomly assign one half of the participants to one measure and one half to the other. While each participant needs to respond to one measure only, we can still

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[12] For additional information about sampling procedures, see Annotated References Nos. 7 and 8.

[13] A measure, such as the criterion-referenced measures found in Chapter Five, generally consists of a group of items, such as questions on a test or statements on an attitude inventory.

derive a defensible estimate of how all the participants would have responded to both instruments.

In addition to sampling persons, as in the previous examples, it is also possible to sample items so that different sets of items are randomly selected to be administered to different persons. In such an approach we give each program participant only a sample of the items for which we want to obtain evaluation data. For example, suppose a program evaluator wishes to administer a 40-item test. Given, say, 60 participants in the program, the evaluator could divide the test into four sets of 10 items each and administer each set of items to 15 participants. By having the four groups of 15 participants each complete a different set of 10 items, the total group's performance can be estimated. This approach allows the data-gathering to be carried out in one-fourth the time that it would have taken to administer the total 40-item test to all participants.

Given the relatively small numbers of participants in some exercise programs, is it really appropriate to sample either persons or items? How large must groups be before sampling procedures can be sensibly used? Although an unequivocal answer to this question would be desirable, such a definitive answer does not exist. Some texts on sampling do provide rules of thumb for estimating the size of samples needed for detecting group differences in relationship to the magnitude of differences sought and the nature of the groups being sampled. At best though, these are rough estimates. It is important to recognize that the task of identifying a sufficiently large sample is more difficult than usually thought.

Intuitively we may recognize that when we start with a very small group of program participants, the use of sampling is risky. For instance, if there were only 15 participants in a program, few evaluators would try to split these participants into three groups of five each for purposes of taking different tests. Even though each group represents one-third of the total population, there is too much likelihood that a sample of five individuals does not properly represent the total group.

The variability of participants' anticipated performances on the measures is the primary influence on the sample size necessary. The following example illustrate this principle. If a man's socks were all stored in a drawer, yet there were only black and brown pairs, he wouldn't need to draw out too many pairs until he had a reasonably good idea of the characteristics of the total population of socks in his drawer. But suppose he had socks in 10 different colors. Then he would most likely have to take out many

more pairs until he could reach an accurate estimate of the colors of socks in the drawer. In much the same way, if it is expected that participants' scores on a test will be relatively homogenous, then a smaller number of respondents will be needed than if participants' scores are expected to be widely varied.

In considering any of these sampling procedures, it should be noted that the evaluator is essentially focusing on a group of participants in the aggregate. Because evaluations are typically concerned with the effects of programs on groups of participants, sampling procedures are usually appropriate. If, however, program personnel need individual data on all examinees on all measures, then sampling is not appropriate.

When to Administer Measures

Decisions regarding when to administer the measures depend on the data-gathering design selected. Conceivably, there are five time periods during which it may be useful to obtain information on participants, and there may be reasons for repeated measurement during some of these periods. These time periods are depicted in Figure 1.3.

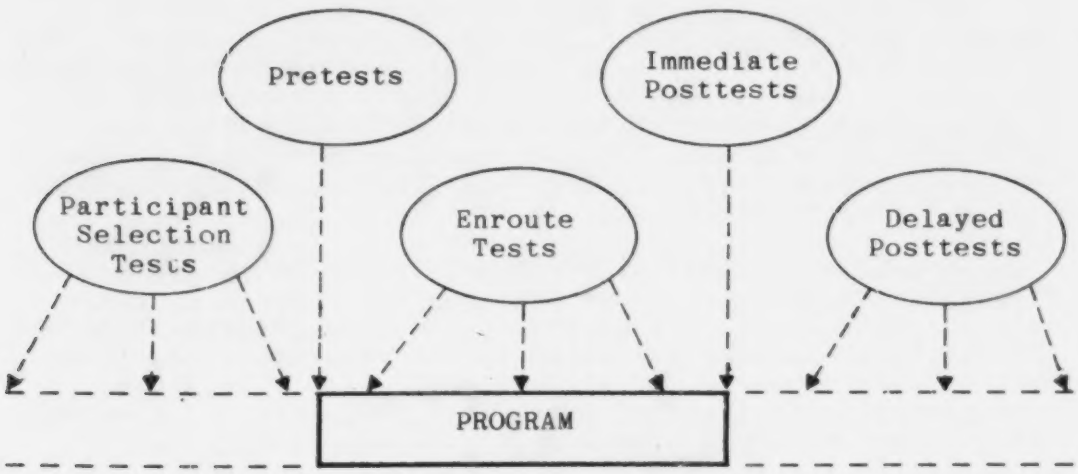

Figure 1.3 Possible measurement times in program evaluation studies.

The first point at which one might choose to obtain information would be prior to the selection of participants. In some exercise programs anyone who wants to attend the program is admitted. In other programs there may be more applicants than program openings. Or perhaps there are multiple variations of a program, and different participants must be assigned to different variations. In these latter cases it may be useful to have information to help in the selection of participants. One may want to select as participants those individuals most in need of the program, or those with the most (or the least) perceived ability to attain the behavioral change sought in the program. In any event, information at this juncture may help the selection process become more effective than it might otherwise be.

Often it is useful to have information about participants immediately prior to their starting the program. Such data, often referred to as pretest data, may be used to identify participant weaknesses so that instruction can be targeted directly to those areas rather than emphasizing things that participants already know. Such data may also be used as a baseline, in conjunction with data collected at the end of a program, to determine the impact of the program. If data have already been collected on participants at the selection stage, it might be unnecessary to re-administer measures unless it has been a long time since the initial administration, or unless there are reasons to expect a change in participants' performance.

Measures can also be administered during a program to secure a current reading on the status of participants. Such en route data can be used to redirect program resources during the program itself. One or more en route measurements can provide program personnel with ongoing status checks on participants' progress. Such data may be even more useful than data collected at the end of a program, for they provide information while there is still time to act on it.

Immediate posttest data are data collected directly following the program. Such data may be compared to pretest data in order to provide an estimate of the changes in participants following participation in the program. Participants' posttest performances can also be contrasted with scores from participants in other programs. Such data may also be used by themselves as a measure of the absolute status of participants.

Delayed posttest or follow-up data, e.g., data collected one year after a program's conclusion, are often equally if not more important than immediate posttest data in evaluating a program. Far too frequently data collection efforts are limited to immediate outcomes, when measurement is most con-

venient. Ultimately, however, program personnel are more interested in effecting long-term behavioral, affective, or cognitive changes. It is sometimes difficult to infer such long-term changes on the basis of information gathered solely at the end of a program. Hence, some follow-up measurement, perhaps repeated, is usually warranted.

Clearly, it is not sensible to administer all measures at all time periods. Evaluators, in collaboration with program personnel and other interested parties, need to select an evaluation design that focuses on the most appropriate times for gathering data. Just as one wishes to avoid administering an overwhelming number of different measures, one also needs to avoid an overwhelming number of administrations. In some situations it may be useful to administer certain measures on a continuing basis (e.g., a behavioral measure), while others might be administered far less frequently. Decisions about when to administer what sorts of measures should be guided by common sense, attentiveness to participants' rights and feelings, and the efficient use of resources.

Data Analysis[14]

A frequent question in evaluation is whether the results of the evaluation are statistically significant. Could observed effects of the program have occurred merely because of the particular sample used in the study? Are the differences so small that they might have occurred simply by chance? Statistical tests are used to answer these questions, and in order to do so these tests make certain assumptions about the data being analyzed.

To illustrate the sorts of assumptions that statisticians make about the data they analyze, we can consider levels of measurement scales. Statisticians draw distinctions between various levels of measurement, that is, data gathered from nominal, ordinal, interval, and ratio scales. Nominal scales classify information into categories without any implied order. For instance, when we categorize individuals into males and females, this is a nominal scale. Ordinal scales rank data in order, such as when we might rank a number of individuals according to their overall healthiness. An interval scale is one which assumes that there are equal intervals between equidistant points on a scale. To illustrate, a 10-point difference between scores of 43 and 53 on a 100-item test about the effects of exercise would be considered identical to a 10-point difference between scores of 67 and 77. A ratio scale is an interval

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[14] For additional information about data analysis, see Annotated References Nos. 13, 19, 28, 33 and 35.

scale for which a zero point exists, such as a weight or height scale, in which there is a true zero.

When we select statistical techniques, it is important to match the statistical test with the type of data being analyzed. For example, in analyzing nominal data one must use statistical techniques specifically designed for such situations. Chi square, for instance, is one of several frequently employed nonparametric techniques for analyzing nominal data. Other nonparametric techniques are used to analyze ordinal data. A chi square test can be used to compare the actual frequencies in two or more nominal categories with the frequencies which might be expected by mere chance. Chi square, however, would not be a wise choice for analysis of ordinal or interval data because nonparametric tests fail to use all of the available information, hence are typically less powerful than more appropriate alternatives. Thus, one must be certain that the assumptions associated with particular statistical techniques have been satisfied.

The following statistical procedures are ones that are used primarily with interval and ratio data, that is, data which assume equal intervals between points on the scale. Such procedures are known as parametric tests. Cognitive tests are almost always assumed to be interval scales. In addition, attitude scales, although not necessary interval scales, are often analyzed using parametric procedures under the assumptions that the points on the scale reflect equal increments of the characteristic, and that the analyses are only slightly distorted if this assumption is violated. Thus, knowledge, skill, and affective measures are frequently analyzed using the following procedures.

One of the most basic parametric procedures used is a *t* test, which is used to test the significance of the difference between two independent means. (Recall that a mean is the arithmetic average of a group of scores, computed by summing all the scores in a group, then dividing this total by the number of scores in the group.) Suppose, for example, that an evaluation were conducted to compare the effectiveness of two health education programs, and that at the conclusion of each program a knowledge measure were administered to a sample of participants. A *t* test could be used to compare the mean posttest scores of those two programs to determine if observed differences were statistically significant. If there were three or more programs being compared in this way, an analysis of variance (ANOVA) would be used.

Two other techniques, gain scores and analysis of covariance (ANCOVA), are frequently used (and, unfortunately, frequently misused) when both pre-program and posttest data are available for participants in one or more programs.

Both techniques use pre-program information in an attempt to compensate for initial group differences between participants in different programs. So, for example, if an evaluator were interested in determining the degree of attitudinal or cognitive change in participants as a result of a program, the evaluator might compute a gain score (posttest score minus pretest score) as a measure of change. However, dangers associated with the use of gain scores are well documented, and such scores should not be used without considering the ways in which they may be misleading.

ANCOVA is frequently used when an evaluator wishes to compare the mean differences between two or more programs on a posttest measure (as in ANOVA), but recognizes that there may have been preexisting differences among the groups, as identified by a difference on mean pretest scores or demographic differences among groups. ANCOVA compares posttest means after an adjustment to the posttest scores has been made for these preexisting differences. Unfortunately, however, if these differences are systematic and not a function of random differences among groups, ANCOVA does not provide an adequate method for equating the groups. Hence, evaluators and program personnel need to use caution when conducting such an analysis or interpreting results from it.[15]

As one becomes more conversant with the purposes sought by various statistical analysis procedures, it is possible to consider those purposes in relationship to the levels of measurement (e.g., ordinal) required of each procedure so that a routine guide to the selection of statistical procedures is available. For example, the three general purposes of statistical analysis are description, association (correlation), and comparison (difference-testing). We can cross those purposes with the three most common types of data and secure a 3 x 3 table in which, for example, to test the differences between two sets of ordinal data we would use a nonparametric Mann-Whitney test. Such tables are found in numerous statistics texts, including several of those cited in the handbook's annotated references.

Another choice-point faced in the analysis of data concerns the appropriate unit of analysis. Most people

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[15] There are numerous statistical computer packages and programmable calculators that conduct these and many other statistical procedures for users. To optimize the ease and efficiency of data analysis efforts, evaluators should anticipate likely procedures for analyzing their data and collect data in the manner most compatible with their analysis plan and the available computer software.

are familiar with analysis procedures in which the individual participant is the unit of analysis. Yet, there are instances in which the unit of analysis treated statistically should not be the individual participant but, rather, a group of participants. The guiding principle in selecting an appropriate unit of analysis is that one should choose the smallest independent unit to analyze. To illustrate, suppose a health education program involved the use of peer support discussion groups of 10-12 people each in order to encourage adoption of a given health-related behavior. Because the individuals in each group would surely interact during discussions, hence not be independent, one should consider each group's average score to be the unit to be analyzed. Again, the focus must always be on the smallest independent unit capable of being analyzed.

Statistical tests only help us detect statistical significance; they do not help us determine whether an observed difference has practical significance. A small difference between the average scores of two groups can be statistically significant, particularly when large numbers of participants are involved, yet be of no practical consequence whatever. Evaluators will need to make sensible determinations regarding whether the magnitude of an observed difference, even though statistically significant, is sufficiently important to warrant action. In other words, though evaluators of health education programs should often carry out statistical significance tests, they should not be unduly swayed by the results of such analyses. Common sense must always be applied regarding the meaning of a statistically significant result.

Reporting Results[16]

Reporting the results of an evaluation study is a more difficult undertaking than is usually recognized. Results must be reported to decision-makers in a timely fashion. It does no good to receive an evaluation report three weeks after key program decisions needed to be made. Evaluators must also pay careful attention to the schemes they will use to disseminate their studies to all appropriate audiences. If possible, an evaluator should circulate preliminary drafts of a program evaluation to program personnel so that they can react to its accuracy and objectivity.

The decision-makers whom evaluators are assisting may have little experience with quantitative data. As a consequence, complicated statistical presentations may be of

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16 For additional information about reporting the results of an evaluation, see Annotated References Nos. 21 and 26.

little value to them. Evaluators should select data-presentation procedures consonant with the technical sophistication of the decision-makers involved.

There is nothing wrong with simple graphs or "percentage correct" tables. If Program Z participants outperformed Program Q participants by 15 percent, then a bar graph representing that difference is a readily understood technique for communicating Program Z participants' advantage. (In the creation of such graphic presentations, be certain that the form of the graph accurately represents the data being depicted.) The more intuitively comprehensible the data presentation techniques, the better. Program evaluators should provide straightforward presentations of data, not fear that such approaches will be regarded as too elementary. Adequate technical back-up can be appended elsewhere.

Evaluators should not be afraid of making speculations based upon their hunches about a program so long as such conjectures are identified as such. Similarly, if any of the evaluation's findings are equivocal, then the evaluator should advise concerned audiences of this. Honesty and objectivity are the hallmarks of effective evaluation reporting. In addition, because decision-makers are typically busy people, evaluators should strive for reasonable brevity in their reports. The use of executive summaries to accompany lengthy reports is a useful practice.

The fundamental concern regarding reporting of results is that the whole thrust of the evaluation enterprise is to sharpen the decisions that are made. Decision-making will not be illuminated by incomprehensible presentations. The quality of decision-making can be enhanced only if data are understood.

Linking Measurement and Program Design

As has been stressed earlier, criterion-referenced measures are primarily useful in that they provide a clear description of what is being assessed. Those descriptions can be particularly useful to program designers and program evaluators as they attempt to create programs which focus on promoting certain attributes. To illustrate, one powerful instructional principle for promoting skills involves providing students with adequate "time-on-task." By giving students sufficient time-on-task, that is, sufficient opportunity to practice the skills sought, students can more readily attain those skills. The clarity with which a criterion-referenced measuring instrument explicates the skills that it is measuring makes it possible for program designers to organize instruction that will be congruent with the measures being employed and, thus, enhance the like-

lihood that program participants will acquire those skills. A program's designers should become intimately familiar with an intended posttest's specifications before they put together their program. Clearly described measures can become powerful catalysts to effective program design.

Ideally, the measures used to evaluate a program will have been deliberately constructed so that they not only assess important outcomes, but also so that they assess them in such a way that those outcomes can be promoted more effectively. Part of the challenge in evaluating health education programs is to select criterion-referenced measures which are not merely end-of-program gauges of effects. Instead, measures should be selected which function proactively to guide program designers and program evaluators as they attempt to improve the program's quality.

CHAPTER TWO

A DESCRIPTION OF THE HANDBOOK'S MEASURES

Chapters Five and Six of this handbook contain a number of program evaluation measures. These are measuring instruments which may be employed in the evaluation of exercise programs. For the newly developed measuring instruments, one form of a measure is typically provided for use with adults and older adolescents. Where appropriate, a simplified version of that measure designed for elementary grade children is also provided. In this chapter the nature of these measures is briefly described. Several types of measurement strategies not included in the handbook are also discussed.

Varieties of Assessment Instruments

There are numerous ways of classifying measuring devices. Sometimes, for example, tests are distinguished according to the way in which an examinee's responses are scored. To illustrate, we often refer to objectively scored tests such as those consisting of multiple-choice items. We also refer to subjectively scored tests such as essay examinations.

More frequently, however, measuring devices are categorized according to the type of examinee behavior that the measure is designed to elicit. One of the most commonly employed schemes for classifying measures is the three-category division of cognitive, affective, and psychomotor behaviors. A cognitive measure focuses on an examinee's intellectual behaviors. An affective measure deals with one's attitudes, interests, and predispositions. A psychomotor measure gauges one's proficiency in performing small or large muscle skills.

In reviewing the types of outcomes sought by most exercise programs, four readily distinguishable categories account for the major outcomes of interest to educators. These four categories have been used in developing and categorizing this handbook's measures.

Four Categories of Measures

The four categories used to classify measures in the handbook are (1) behaviors, (2) knowledge, (3) skills, and (4) affect. It is generally held that individuals' behaviors are influenced by their knowledge, skills, and affective dispositions. Consonant with that view, when the expert

panelists isolated outcomes for which measures were to be included in the handbook, they first identified potential behavioral outcomes, then attempted to isolate the knowledge, skill, and affect outcomes which would contribute to each behavioral outcome. Let's look more closely now at each of the four types of measures included in this handbook.

Behavioral Outcomes. Measures for behavioral outcomes attempt to assess the routine behavior of individuals under normal circumstances, such as whether or not individuals exercise regularly. Most exercise programs strive to bring about lasting behavior changes in program participants, hence are ultimately focused on the promotion of behavioral outcomes. For example, a program designed to encourage individuals to exercise regularly is less concerned with participants' end-of-program scores on a written test about the effects of exercise than with their actual exercise patterns well after the program has ended.

There are several commonly employed data-gathering procedures used to secure information about individuals' behaviors. We can observe peoples' actual behavior (observation), ask them to tell us about that behavior (self-report), or physically monitor that behavior (physiologic indicators).

Evaluators are sometimes intuitively drawn to the virtues of observational approaches because, after all, "if we observe a behavior of interest, then we can be certain that the behavior actually took place." But, intuition aside, there are substantial difficulties with the use of observational techniques in assessing the impact of health education programs. For one thing, it is difficult and often costly to train observers so that they observe the behavior of interest with accuracy and consistency. More importantly, however, in most health settings we are interested in human behaviors that occur at various and unpredictable times over an extended period. Often these behaviors occur in private. Not only would the cost of paying for continuous observations be staggering, but it is clearly impractical (and, possibly, unethical) to observe individuals on an around-the-clock basis.

For some health-related behaviors it is possible to employ physiologic measurements in order to make inferences about the nature of individuals' behavior. A laboratory analysis of a person's blood composition can, for instance, reveal whether that individual has been consuming alcohol. Similarly, other physiologic tests can be used to detect traces of nicotine in the body, hence lead to reasonable conclusions about an individual's smoking behavior. In many instances the cost of using such physiologic measures may

be prohibitive for the conduct of routine program evaluations. However, in "high stakes" evaluations, that is, significant evaluations of major impact programs, or when it is relatively easy to administer physiologic measures, evaluators will certainly wish to consider the possibility of employing such measures in lieu of or in addition to self-report or observational techniques.

As with observational techniques and physiologic measures, there are definite problems associated with the use of self-report measures as a way of identifying individuals' behaviors. Not the least of these problems is the possibility for individuals to distort their responses on self-report measures so that they do not reflect actual behavior. Yet, on balance, the use of self-report measures often offers evaluators the best practical method of securing meaningful evidence about the actual behaviors of participants. In light of these practical considerations, therefore, the handbook's newly-developed behavioral measures are all of the self-report variety. A number of recent studies suggest that self-report assessment devices can be effectively employed as supplements to physiologic measures.[1]

Knowledge outcomes. Most health education specialties have a great deal of knowledge, that is, factual information, which must be transmitted to program participants. The evaluator's task is to employ measurement devices which can effectively assess participants' abilities to recall this information. Most such tests consist of objectively-scored paper-and-pencil measures of one sort or another.

Knowledge tests typically pose a variety of questions related to the factual information being assessed. In most of these tests there is substantial ambiguity regarding what information is eligible for testing. Suppose, for example, that an instructor in a physical education program merely knew that there would be questions on a posttest dealing with techniques for injury prevention. There is simply no way to anticipate the enormous variety of test items which could be constructed regarding these procedures. To the extent that the program's quality is being judged, at least in part, by participants' performances on the posttest, the program's evaluation is at the mercy of an item-writer. No one except the item-writer knows for sure what is to be tested.

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[1] See, for example, Petitti, D.B., Friedman, G.D., & Kahn, W. Accuracy of information on smoking habits provided on self-administered research questionnaires. American Journal of Public Health, 1981, 711, 308-311.

To counteract this difficulty, all of the knowledge measures specially developed for this handbook consist of test items based directly on a series of statements embodying important factual information related to the content area being tested. All of the test-eligible statements are listed in the sets of test specification used to generate the test items. (See Chapter Seven) In addition, the test specifications set forth the permissible variations of these statements that can be used to create binary-choice True/False items. As a result, both the program's instructional staff and the evaluator possess an unambiguous idea of the universe of content upon which the knowledge tests will be based.

One advantage of using binary-choice test items is that an exhaustive list of all the content eligible for testing can be compiled. An additional advantage of the binary-choice approach to the assessment of knowledge is that if the program is targeted at individuals who do not possess reasonable reading skills (such as, say, limited English-speaking participants), the items can be read aloud to examinees with little increase in the necessary testing time. Reading aloud a series of multiple-choice or matching items would be far more cumbersome.

It is sometimes feared that the results of a binary-choice test may reflect mere chance rather than what examinees actually know, simply because examinees can correctly guess answers at a 50 percent rate. Although it may be true that guessing can play a major role with one or two True/False items, with longer tests the odds of guessing one's way toward success are slight indeed. For example, there is one chance in four that an examinee could correctly guess answers on two binary-choice items. To guess ten out of ten such items correctly, however, the odds shrink to less than one in 1,000. By using binary-choice tests that contain a sufficient number of items, for instance, tests with 20 or more items, we substantially reduce the likelihood that guessing will so influence an examinee's test score that we do not secure a reasonable estimate of that examinee's knowledge.

Because examinees will always be able to guess some items correctly on a binary-choice test, program personnel should not become too jubilant over scores that are slightly above the 50 percent correct expected by chance alone. By using reasonably long binary-choice tests, however, there usually will be more than enough variability in examinee performance to detect differences in the effectiveness of programs.

Skill outcomes. Outcomes dealing with participant skills are those which call for examinees to apply knowledge, not merely recall it. The attributes assessed in the handbook's newly-developed skill measures are all higher order cognitive skills. For example, one's ability to select an appropriate exercise program would be an example of the type of skill measured by the handbook's skill measures.

These skill measures generally emphasize test items in which the examinee is asked to employ higher order cognitive processes to distinguish among choices in a variety of simulated real-life settings. All of these choices focus on health-related courses of actions that an individual might pursue. In other words, application, not recollection, has been sought in the handbook's skill measures, forcing examinees to employ skills in settings approximating those they would encounter in real life. In many instances the skill measures build directly on the knowledge measure(s) associated with outcomes most closely related to that skill.

Affective outcomes. Affective outcomes refer to the variety of non-cognitive variables, such as attitudes, interests, and values, which are thought to predispose individuals to act in a particular manner. A negative attitude toward the utility of exercise, for example, is believed to incline a person to avoid exercising. Similarly, a positive attitude toward the effectiveness of regular exercise is thought to dispose a person toward exercising regularly.

Although it is possible to infer the nature of an individual's affective status from observations of that person's behavior, the most common technique for assessing affect involves the use of self-report inventories. The manner in which the items on a self-report affective inventory are constructed yields scores which require either (1) little in the way of inferences to interpret the scores or (2) substantial inferences in interpreting the meaning of the scores. We refer to the former as low-inference self-report measures, and to the latter as high-inference self-report measures.

Low-inference self-report measures typically present respondents with a series of straightforward questions or statements such as those asking for the degree of agreement with positive and negative statements about regular exercise. Responses to such measures can be readily interpreted if respondents are telling the truth. To heighten the likelihood of securing truthful responses, those completing affective measures are often directed to return them anonymously.

High-inference self-report measures are typically designed to be less transparent in what they are attempting to measure. To illustrate, if a relationship had been found between individuals' educational levels and their exercise patterns, we might ask people about their educational background in order to get at their attitudes regarding exercise. The virtue of high-inference measures is that, because their purpose is masked, it is difficult for the respondent to provide dishonest responses or to respond in the direction deemed desirable. On the other hand, in order to interpret the results from high-inference measures, we often must make quite tenuous inferential leaps. The less obvious the purpose of the items, the less likely that individuals will respond untruthfully, but the greater the required inference.

Because of the interpretation risks associated with high-inference assessment schemes, all newly-developed measures of affect in the handbook employ low-inference strategies. These self-report affective inventories sometimes rely on Likert-type scales wherein the respondent registers varying degrees of agreement/disagreement with statements regarding the affective dimension of interest. In other instances respondents are asked to estimate whether or not they intend to behave in certain ways, then are told to indicate the degree of confidence which they have in each such estimate.

In general, it is assumed that a person's knowledge, affect, and skills contribute directly to that individual's behavior. And since most exercise programs are ultimately interested in modifying participants' actual behaviors, then the acquisition of appropriate knowledge, affect, and skills can be seen as potentially precursive to the attainment of desired behavior. Thus, in evaluating exercise programs that have not succeeded in achieving desired behavioral changes, it is often possible to detect shortcomings in the promotion of en route outcomes dealing with knowledge, skills, or affect.

Other Indicators of Effects

As indicated earlier, this handbook does not contain observational assessment techniques or physiologic measures. It also does not treat measures of health effects which might be used to determine whether exercise programs are having their desired impact. Only the previously described behavioral, knowledge, affective, and skill measures have been included. These four categories certainly do not exhaust the range of possible assessment tools that evaluators should consider when they undertake an evaluation. There are numerous other sorts of extant data and assessment strategies which should be thought of as potentially helpful.

As an illustration of the sorts of existing data that evaluators often find useful, we can think of the numerous archival records of relevance to health behavior, e.g., records of doctor's visits, or the incidence of heart disease. Such archival data can often prove illuminating in making decisions about exercise programs. Evaluators must attempt to locate existing records of such phenomena if they pertain to the decisions under consideration.

To illustrate the kinds of more elaborate assessment strategies which might be used, we will briefly describe one technique designed to secure responses to sensitive questions. The randomized response technique (RRT) is an effective technique for obtaining accurate information from respondents on a small number of highly sensitive issues such as the use of illegal drugs or alcohol. By presenting respondents with both a sensitive and a nonsensitive question, and by having respondents themselves use a random procedure (such as a coin flip) to select the "to be answered" question, respondents are expected to answer the sensitive question honestly because the interviewer can not know which question is actually being answered. An example of the non-sensitive question might be "Have you attended a PTA meeting at school during the past 12 months?" The sensitive question might ask, "Have you used heroin during the past 12 months?" An accurate estimate of the number of people responding "yes" to the sensitive question (e.g., the number of people reporting heroin use) can then be computed by subtracting the likely proportion of "yes" responses to the non-sensitive question.

Another assessment strategy involves the use of respondents as "informants" who report information about relatives, friends, etc. Often these reports can be made so that the individual about whom the report is made remains anonymous. This procedure, described as the multiplicity technique by some and the nominative technique by others, is described in more detailed elsewhere.[2]

Previously-Developed Measures

In addition to the development of new measures to coincide with high priority outcomes, an extensive effort was made to identify existing high quality measures which corresponded to these outcomes. This effort included a comprehensive computer search of seven data bases, recommendations of measures from panelists and panel-identified experts, and reviews of books, articles, and instruments submitted by panelists.

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[2] Fishborne, P. Survey techniques for studying threatening topics: A case study in the use of heroin. Unpublished doctoral dissertation, New York University, 1980.

The computer search was conducted at the UCLA Biomedical Library using the following data bases: the Medline, ERIC (Educational Resources Information Center), Psychological Abstracts, Excerpta Medica, NIMH (National Institute of Mental Health), NCMH (National Clearinghouse for Mental Health), and SSIE (Smithsonian Science Information Exchange). In addition to input from the project panelists, area-specific experts and agencies identified during the project were sent summaries of the expert-panel meeting accompanied by a letter requesting assistance in the effort to locate existing measures and relevant publications.

Once collected, all measures were subjected to an initial content screening by an experienced reviewer. The purpose of this screening was to determine whether a measure corresponded to the panel-identified outcomes. Measures which satisfied the outcome congruence screening were then subjected to a further psychometric review. Prior to initiating the review of a measure's psychometric quality, however, the authors or agencies who developed the measure were contacted to request any available supporting documentation or relevant data about the instrument. In addition to being given an overview of the purpose of the project, authors were informed of the criteria to be used in the psychometric review in order to minimize the possibility that they might inadvertently fail to supply relevant data.

The primary criterion for inclusion in this handbook was, ultimately, degree of congruence with priority outcomes. Several measures of high quality had to be excluded because they did not possess sufficient correspondence with these outcomes to be of use to evaluators interested in assessing those outcomes. There are, in fact, several handbook outcomes for which no previously-developed measures have been included, primary because of a lack of existing measures targeted to those outcomes. Where multiple measures with adequate correspondence to given outcomes were identified, the measures included in the handbook were selected on the basis of their item quality and the extent to which the set of measures selected for an outcome represented a range of approaches to the measurement of that outcome.

Test Specifications

For each of the measures developed for the handbook a set of test specifications was created to guide in the construction of the measure. As indicated in the previous chapter, this set of specifications operationalizes the outcome statement for which the measure serves as an indicator. The test specifications for all newly-developed measures are presented in Chapter Seven.

Evaluators and program personnel should find the test specifications of substantial utility, as these documents set forth in unequivocal terms the attributes being measured. This clarification of what is assessed should permit program personnel and evaluators to target their efforts more precisely to the program outcome as operationalized by the set of specifications. While one can employ the measures without referring to the specifications, most users of the measures will be markedly benefited by studying the set of specifications for each measure to be used. Program personnel in particular may want to consult the content supplements and the descriptions associated with many of the measures when planning their program itself.

The test specifications also permit program personnel to generate additional test items, if they so desire, by following the rules for item construction which have been set forth. Additional test items may be particularly useful in conjunction with knowledge and skill outcomes, where they can be employed during the course of a program as instructional tools and to monitor participant progress. Evaluators should realize, however, that any new measures created from the test specifications will not necessarily be <u>equivalent</u> forms, that is, forms equal in difficulty and other psychometric aspects to the forms presented in the handbook. Performance information on both the original form and any alternate forms would have to be gathered before the equivalence of such measures could be demonstrated. Therefore evaluators should be reluctant to use alternate forms as though they are equivalent, for example, in a pretest-posttest design.

To reiterate, then, in Chapters Five, Six, and Seven will be found, respectively, the newly developed measures, the existing measures, and the specifications for the newly developed measures. All of the outcomes upon which these measures are based are presented in Chapter Four. Each chapter is introduced with a brief description of that chapter's contents and an indication of the major descriptive headings contained therein. In Chapter Three suggestions are offered for using the measures in program evaluation.

CHAPTER THREE

HOW TO USE THIS HANDBOOK

Selecting Evaluation Measures

The measures that are selected for a program evaluation should correspond, as closely as possible, to outcomes of interest and importance to program personnel or other decision-makers associated with the program (e.g., the program's sponsoring agency). In some cases the measures may correspond directly to program goals. Other measures may be selected because they correspond to outcomes of ancillary interest. For example, if a program were focused on modifying participants' exercise patterns, it might also be of interest to see if attitudinal changes also resulted from the program.

The desire to have a broad understanding of the impact of the program, potentially across all four areas for which this handbook presents measures, must be balanced with the need to avoid unnecessary use of program or evaluation resources. There are likely to be many interesting things about a program that one would like to know. But answering those questions requires the time and money of the program and, most likely, the time of program participants. Because personnel and financial resources are limited, and also because participants may come to resent what they consider to be unnecessary intrusions, measures should be selected carefully. An emphasis should be placed on using those measures that are likely to have implications for improving the program in the future.

One way to use the handbook is to determine the extent to which its outcome statements coincide with a program's stated objectives. Measures for those outcomes can then be considered as possible assessment devices to use in gauging the attainment of program objectives.

Another way to use the handbook is to consider its measures as reflecting possible outcomes that might be promoted by programs. As indicated earlier, program designers can create more effective programs if they comprehend clearly the nature of the targets at which the program is aimed. Although the sets of measures included in this handbook are far from exhaustive and certainly not prescriptive in any sense, they do represent a range of possible program aspirations. Furthermore, the measures are based on outcomes deemed important by a panel of experts well acquainted with exercise programs.

By reviewing all of the outcome measures in the handbook, at least by reading each measure's descriptor sheet, program designers and program evaluators can increase the range of options they may wish to consider as potential program outcomes.

Administration Procedures[1]

Evaluators need not develop special sets of directions in order to administer the measures that are presented in this handbook. Directions are provided with each measure, informing respondents how to supply the requested information. Test administrators should be sure to familiarize themselves with the directions and the measure itself before administering it. They can thus provide clear and accurate information to any requests for clarification by respondents.

Test administrators, whether or not they are program personnel, should be sensitive to the potential difficulty some respondents may have in reading either the directions or the test items themselves. Test administrators should be available to assist respondents as needed. It may be useful, if there is concern about the reading ability of the respondents, to read the directions aloud so as to ensure that all respondents understand what they are to do. If there is doubt about the ability of respondents to read the items, the items themselves on most measures can also be administered orally, either to groups of participants or to individuals. Respondents should be encouraged to ask questions if they do not understand their task or any items on a measure.

As a related issue, the measures do not require respondents to supply their names. This was done to help ensure the confidentiality of responses to potentially sensitive issues. If program evaluators believe that the integrity of the data would not be compromised by asking respondents to provide their names or other personal or demographic information, such information may be requested. Alternatively, if evaluators wish to be able to link performance on one measure to performance on another, this may be accomplished by assigning a code number to every individual and having the individual use that code designation whenever providing data. Respondents may also select their own identification code (e.g., mother's maiden name) if this would help alleviate fears about preserving confidentiality. In such cases, it is important that the same code be used consistently on all measures.

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[1] For additional information about administration procedures, see Annotated References Nos. 15 and 27.

The use of anonymously completed measures highlights a general concern associated with the administration of such measures in a program evaluation context. Test administrators should strive to create conditions in which respondents are genuinely comfortable in supplying truthful answers. Too often we find program personnel administering evaluation devices under circumstances which create subtle pressures for participants to respond in a manner satisfying to program staff. An effective evaluation, however, is based on honest responses, not socially desirable ones. Thus, all aspects of measure administration should be conducted with careful attention to the possible impact on participants' responses. For example, an external person rather than a member of the project staff could administer measures. Responses could also be collected anonymously, then placed in sealed envelopes in plain view of all participants. Other such techniques might be devised in order to elicit honest responses. Additional considerations related to possible response bias will be discussed later in this chapter.

Scoring

Scoring keys are provided for all newly-developed knowledge, skill, and affective measures, as well as for all existing measures which had such information available. A more complete justification of the proposed scoring scheme associated with each newly-developed affective measure is also presented in its corresponding test specifications.

As a general rule, knowledge and skill measures are scored by computing the total number of correct responses. Affective measures are scored by computing the average response for a given measure. This procedure for affective measures simplifies interpretation of the obtained score (e.g., a respondent would obtain a score of 4.2 on a 5-point scale, rather than obtaining a score of, for example, 46 out of 55 points). It also reduces confusion in dealing with omitted responses.

On the newly-developed measures, higher scores are better. That is, higher scores on the cognitive measures (knowledge and skills) indicate that the respondents answered more items correctly. High scores on the affective measures indicate attitudes consistent with those promoted by the program (as set forth in the outcome description). A specific scoring key is not provided for behavioral measures, where it should be clear from the items themselves what the desired behavioral change should be.

In addition to considering performance of respondents on the total measure, items on some of the newly-developed

affective measures are categorized to permit consideration of the different dimensions in the measure. Hence, part scores as well as total scores can be computed to provide a more in-depth analysis of participants' responses. Similarly, an analysis of incorrect responses is provided on selected skill measures to assist program personnel in determining the kinds of incorrect answers (distractors) that have been selected by examinees. By considering not only whether items were answered correctly, but also by looking for patterns in the incorrect responses, program personnel can often target the program towards reducing common misconceptions. Thus, by using the incorrect response analyses, program personnel may be able to infer why specific incorrect options were selected and also enhance program participants' understanding of the correct response by describing to them the flaws in frequently selected incorrect responses.

Missing data. One of the most frequent sources of confusion in scoring measures stems from the treatment of missing data. For purposes of this discussion we shall consider two types of missing data. The first type of missing data arises when a respondent does not answer certain items on a measure. The second type of missing data occurs when a respondent does not return a measure at all.

In the former case, suppose a respondent omits one or more items on a measure. Should the scorer infer that the respondent didn't read the item, didn't know the answer, or didn't understand the question? The way missing data are treated depends on the type of measure (cognitive, affective, or behavioral), the scoring procedures being used, and the judgment of the person responsible for data analysis. As a general guideline, one should try to treat missing data in a manner consonant with the most plausible assumption about why the data were omitted. A few examples may illustrate.

Blanks or omitted responses are often treated as incorrect responses for cognitive measures (i.e., those assessing knowledge and skill). Respondents' scores are then the sum of the correct responses, under the assumption that respondents would have marked an answer if they felt they knew it. If there are other more plausible assumptions about why a response was omitted, such as confusion about what the question was asking, this approach might not be advised. In that case, evaluators might consider missing and incorrect responses separately, thus creating a slight increase in the complexity of the analysis procedure.

The best procedure for dealing with missing affective responses should, again, be consistent with the general guideline of selecting the procedure that requires the fewest

unsubstantiated assumptions about the missing responses. Consider the case in which respondents are asked to indicate the extent of their agreement with a series of statements on, for example, a 5-point Likert scale. Because a score on this measure is obtained by averaging the responses, missing data can usually be ignored, and the respondent's score can be computed based on the items for which there are responses. This assumes that the responses to the unanswered questions are, on average, the same as the responses to the questions that were answered. A different approach may be used if this assumption seems unwarranted. For example, if all the items of a particular type are omitted, it may be unwise to assume that the answers to those items would be the same as the answers to all the other items. In this case, the entire measure may have to be excluded from the analysis.

In affective measures on which respondents are required to estimate their confidence regarding a series of statements, similar procedures for treating missing responses can be used. Hence, in contrast to cognitive measures, respondents are typically not penalized for omitting responses on an affective measure.

The problem of how to deal with missing data when certain participants complete no items on selected measures is a more difficult one than the problem just addressed. That is, what can be done if, because the respondent either refused or was unavailable to complete the measure, we have no data at all regarding a given participant's status on a given outcome? The answer to this question depends on the data-gathering design that is being used and on the most likely reasons that the data were not obtained.

One of the more frequent contexts in which this problem arises is when a pretest-posttest design is used. In this design, measures are administered to program participants prior to beginning the program and, again, at the conclusion of the program. Observed changes between pretest and posttest scores are attributed to the impact of the program. But suppose that some participants do not complete the program and, therefore, are unavailable to complete the posttest questionnaires. Differences between the participants' average pretest scores and their posttest scores may come from systematic differences between the individuals who took the pretest and the individuals who completed the program, hence took the posttest. For example, suppose that, even before a program began, some participants had strong intentions to exercise regularly. Others did not. Now, suppose that a disproportionate number of those respondents who did not intend to exercise regularly dropped out of the program. If we considered the posttest responses of only those participants who remained in the program for its entire duration,

while also considering the pretest responses of all the original participants, we would find that the posttest scores indicated stronger intentions to exercise regularly than would the pretest scores, even if the program had no effect on participants' intentions. This situation would arise because of the elimination of a disproportionate number of respondents who did not intend to exercise regularly. Thus, observed changes might be due to differences in respondent characteristics rather than program impact.

To safeguard against this possibility, evaluators must be attentive to the characteristics of respondents, particularly when data at different points in time are compared. In the preceding example, it might be advisable to exclude the pretest data of those participants who did not provide posttest data, and to compute pretest and posttest means on the basis of those individuals for whom complete data exist. To do this would, of course, require using some unique and consistent identification code on all measures completed by each participant so that one could know whose pretest responses should be excluded. If it is necessary to eliminate a particular category of respondents from the analysis, one should be aware of the limitations this imposes on the ability to generalize the findings from the remaining respondents to the broader group of eligible participants. That is, in the preceding example we should only describe the effects of the program on participants who already intended to make the desired behavioral change (remember that a disproportionate number of other participants left the program), not on any person who might consider enrolling in this particular program.

The key issue in deciding what to do when individuals or groups of individuals fail to return selected measures is to determine the extent to which the non-respondents differ in any systematic way from the respondents. Are non-respondents less motivated initially? Do they vary on any major demographic variables, such as sex, ethnicity, or previous education? Are they more knowledgeable about physical fitness than those who completed the measures? If the answer to any of these questions is yes, then it is important not to compare all pretest responses with all posttest responses. If, however, there appear to be no systematic differences between those respondents for whom complete data are available and those who did not return all measures, then it may be acceptable to consider all available data. This might be the case if, for example, several participants were sick on the day posttest measures were administered, but the absent respondents did not differ systematically from the other participants. Thus, the degree of attention to this type of missing data depends on the extent to which there is reason to suspect a systematic bias in the findings as

a result of the missing information. At the very least, an evaluator should describe the characteristics of the participants who completed the measures at each administration period, so that those using the evaluation report can consider for themselves whether the assumptions guiding the treatment of missing data appear to be justified.

Interpreting Responses

It would be comforting to assume that the data, once collected and analyzed, provide accurate accounts of the respondents' cognitive, affective, and behavioral status. Unfortunately, however, there are many instances in which one cannot be certain that the inferences made from the data are fully justified. For example, in the cognitive areas we assume that the more items correctly answered by an individual, the more that the individual knows about the outcome being tested. But it is also possible, although in this case perhaps unlikely, that some respondents who were highly knowledgeable about the information being tested did not get a high score because they couldn't understand some of the items or had a hard time reading the test. It is the test developer's responsibility to try to reduce such confusion by, for example, ensuring that the items are written as simply as possible and that there are no extraneous sources of difficulty. It is the test user's responsibility to remember that there will inevitably be the potential for some confusion, and to interpret the measures in light of this potential.

This problem is probably more apparent in interpreting affective and behavioral measures. It has been well-documented that there are "response sets" or systematic sources of bias in responses to such measures. To illustrate, one of the best known response sets is social desirability, or the tendency of individuals to provide responses which are consistent with what they believe to be expected of them. So, for example, individuals might indicate that they intend to exercise regularly, because they believe that it is "appropriate" for them to do so, rather than because they actually have that intention. There is little that one can do to preclude completely the possibility of such response sets. To reduce at least somewhat the likelihood of response sets, evaluators can avoid language which clearly indicates the desired response, preserve the anonymity of respondents, and ensure respondents that the evaluation is more concerned with understanding the program than with describing selected participants. An atmosphere in which honesty rather than "proper behavior" is promoted is definitely conducive to obtaining accurate responses in sensitive areas.

This problem is, perhaps, even more pronounced in behavioral self-report measures, where respondents may misrepresent their behavior. Respondents may be reluctant to admit that they do not exercise regularly, if they believe that others think it is good to exercise. Although the measures have been developed to encourage accurate responses, it is the responsibility of program personnel and evaluators to do all that they can to promote accurate responses and to minimize the threat of repercussions should individuals behave in undesirable ways. Guaranteeing anonymity is one common procedure, but establishing credibility with respondents is also critical. In addition, observation, physiologic measurement, and procedures such as the randomized response technique may be used to verify the accuracy of behavioral self-reports.

The problem is not as overwhelming as it may sound. Clearly, whenever one must rely on self-report data there is the possibility of inaccurate responses. But careful measure development can reduce the degree of perceived threat in the measures and this can promote honesty. Furthermore, program personnel can help allay the anxiety of respondents so as to increase honesty of responses. Corroboration, or the threat of corroboration, by an external source can reduce the likelihood that respondents will bias their responses. In addition, many designs compare responses at one point in time to responses at another, or compare different groups of respondents to each other. In these comparative designs, whatever systematic bias there is may be found at all measurement times and, hence, may not influence indices of change. Finally, by being aware that such problems may exist, those who use evaluation measures can encourage caution in interpreting evaluation findings and urge verification of data where it is warranted.

Enriching Evaluations

This handbook provides measures that may be useful in assessing a program's outcomes. Typically, a physical educator might select not merely one but several measures to use in a program evaluation. Multiple outcome measures can markedly enhance the quality of an evaluation.

Although the outcomes measured in the handbook have been deemed important, they may not coincide directly with the outcomes of interest to any given program. And they certainly do not exhaust the issues that may be of interest to those individuals involved in a program. Program evaluators and personnel should not limit their data-gathering efforts to the measures provided in this handbook. Rather they should supplement these measures with others that more directly address the particulars of the evaluation settings in which they find themselves.

The emphases of any supplementary evaluation activities should coincide with the information needs and interests of those concerned with the program. Probably the most useful information elicits ways to enhance the effectiveness of the program, either as it has already been implemented or as it will be carried out in similar programs planned for the future. For example, questionnaires may be administered to program participants asking them to identify any follow-up support or information they might need in order to continue to exercise regularly. Participants might also be able to provide specific suggestions for improvement of the program should it be offered to others.

It is impossible to isolate all the information that might be useful to gather for an evaluation. But the following point cannot be overstated: Evaluations should focus on the systematic collection of data that can be used to improve the quality of exercise programs and, in turn, the physical and psychological well-being of participants and of the community at large. Evaluation should not be conducted for the sake of evaluation but should be viewed as a tool to enhance the effectiveness of programs. It can only fulfill this promise if those guiding the evaluative efforts direct evaluation resources with this goal in mind, and if they use their resources wisely. The measures that comprise the majority of this handbook should provide a solid foundation for effective evaluation efforts. But program personnel and evaluators in the field must structure evaluations to serve the needs of those with a stake in the findings, and their professional insights are likely to be the best guide possible.

Using Unproven Measures

In the remainder of this handbook there are numerous measures available for use by evaluators of exercise programs. The measures developed specifically for this project, as well as some of the already existing measures included here, share one substantial shortcoming. They have not been subjected to rigorous empirical investigations to ascertain their psychometric qualities, especially their reliability and validity. When using such measures, how should program evaluators proceed? The answer is all too clear--with great caution.

Although all of the measures included in the handbook were developed with substantial care, until there have been reliability and validity studies carried out which verify those measures' technical adequacy, they should be employed with substantial care. To illustrate, in the absence of reliability and validity data, one should be most reluctant to draw inferences about the meaningfulness of an individual's score on particular measures.

In using measures for purposes of program evaluation, we often aggregate results for a group of participants rather than try to work with individual participants' responses. By using the pooled responses of many individuals, we can have more confidence in the average of the group since anomalous scores will either tend to cancel each other out or be outweighed by the total set of responses. Even with such aggregated scores, however, care is warranted when using measures whose reliability and validity have not been empirically confirmed.

The general caveat regarding the use of measures which have not yet been subjected to empirical analysis is for program evaluators to proceed very carefully in employing such assessment instruments. The new measures that are included in Chapter Five of the handbook were developed with great care, employing a variety of internal and external review procedures to assure that their content and form was appropriate. Yet, although one can have confidence that the process used in their development was systematic and thoughtful, the opportunity to subject those measures to empirical verification has not yet arisen. Such an appraisal of the new measures' technical adequacy is planned for the future. It is likely that the handbook's measures may be superior to the hastily created measures seen so often in the evaluation of health education programs. Nonetheless, evaluators of exercise programs should regard the handbook's measures as a resource to be used--but to be used with prudence.

CHAPTER FOUR

PROGRAM OUTCOME STATEMENTS

The outcomes presented in this chapter are program evaluation goals identified by a panel of subject matter and health education experts selected as advisors for this project. The panelists identified one major behavioral outcome, namely, the maintenance of an acceptable activity level. Knowledge, skill, and affective outcomes considered likely to predispose individuals to adopt this target behavior were also selected. The process by which these outcomes were isolated and put in priority order is explained more completely in the Preface to the handbook.

This chapter's program outcome statements have guided the development of the rest of the handbook. Chapter Five presents newly-developed measures designed to assess each outcome. Chapter Six contains previously-developed measures selected for their congruence with the outcome statements. Chapter Seven consists of test specifications for all the newly-developed measures. These specifications define the outcomes, describing the precise nature of each one.

The outcome statements that follow are relatively brief definitions of a particular behavior, knowledge, skill, or attitude considered important for exercise programs. The title of each outcome statement is used throughout the handbook to reference the measures corresponding to it. As a further aid to handbook users, the outcome statements presented in this chapter are accompanied by the titles of the measures that correspond to each one. The target population for each measure is also noted. Handbook users can locate the measures for each outcome on the page specified.

BEHAVIORAL OUTCOME

MAINTENANCE OF AN ACCEPTABLE ACTIVITY LEVEL

Individuals maintain a planned exercise program of continuous rhythmical motion using large muscle groups. Although the specific program may vary, it must require at least 60 percent of maximal cardiovascular capacity, for at least 20 minutes, three times a week. The program should also enhance muscular strength and endurance and flexibility.

Weekly Activities Index . . . . . page 54

Target population: Adults or adolescents

Canada Fitness Survey - Physical Activities . . . . page 117

Target population: Adults or Adolescents

Questionnaire on Exercise . . . . . page 122

Target population: Adults or Adolescents

University of Pennsylvania Alumni Health Questionnaire . . . . . page 124

Target population: Adults or Adolescents

Physical Activity Monitor . . . . . page 127

Target population: Adults or Adolescents

Measuring the Body's Energy Needs . . . . . page 129

Target population: Adults or Adolescents

KNOWLEDGE OUTCOMES

EFFECTS OF EXERCISE

Individuals can accurately recall information about the physiological, psychological, and sociological effects of exercise.

Facts About Exercise . . . . . page 57

Target population: Adults or Adolescents

Exercise Facts . . . . . page 61

Target population: Elementary school children

AAHPER Cooperative Physical Education Tests . . . . page 130

Target population: Elementary school children or Adolescents

EXERCISE PROGRAM DESIGN

Individuals can accurately recall information about the components of an exercise program and the factors relating to exercise activity selection and implementation.

Designing an Exercise Program . . . . . page 64

Target population: Adults or Adolescents

INJURY PREVENTION

Individuals can accurately recall information about the nature of exercise-related health risks and the types of injury prevention strategies associated with cardiovascular, muscular/skeletal, and environmental problems.

Injury Prevention . . . . . page 68

Target population: Adults or Adolescents

Avoiding Injury . . . . . page 72

Target population: Elementary school children

SKILL OUTCOMES

FITNESS SELF-ASSESSMENT

Individuals can conduct those activities associated with a fitness self-assessment. Such activities include selecting appropriate assessment procedures, using those procedures accurately, scoring and interpreting assessment results correctly, and determining the level at which to initiate an activity program based upon the results of the assessment. The areas to be measured in a self-assessment include pulse rate, height, weight, muscular strength and endurance, and flexibility.

Standardized Fitness Test (SFT) . . . . . page 131

Target population: Adults or Adolescents

PROGRAM DESIGN

Individuals can use fitness assessment data to select exercise programs consisting of activities appropriate in type, frequency, intensity, and duration to achieve personal physical fitness goals.

Selecting an Exercise Program . . . . . page 96

Target population: Adults or Adolescents

AVOIDANCE AND CARE OF INJURIES

Individuals can prevent exercise-related injuries insofar as possible and can safely attend to those injuries which do occur. This skill includes the ability to select appropriate equipment and clothing for an exercise activity, pace oneself, perform warm-up and cool-down exercises, avoid fluid loss, recognize warning signs, modify activities as needed in relation to self-monitoring, use simple self-care techniques, and know when to seek medical advice.

Preventing and Caring for Injuries . . . . . page 86

Target population: Adults or Adolescents

Exercising Safely . . . . . page 93

Target population: Elementary school children

AFFECTIVE OUTCOMES

BELIEF IN POSITIVE EFFECTS OF EXERCISE

Individuals believe that there are positive consequences associated with regular exercise.

Effects of Exercise . . . . . page 98

Target population: Adults or Adolescents

Exercise and People . . . . . page 102

Target population: Elementary school children

Marten's Physical Education Attitude Scale . . . . page 162

Target population: Elementary school children or Adolescents

PERCEIVED ABILITY TO EXERCISE REGULARLY

Individuals believe that they possess the ability to exercise regularly, even if faced with situations that might present barriers to the maintenance of a regular exercise program.

Exercising Regularly . . . . . page 106

Target population: Adults or Adolescents

INTENTION TO EXERCISE REGULARLY

Individuals believe that they intend to exercise regularly.

Exercise Survey . . . . . page 110

Target population: Adults or Adolescents

Exercise Questionnaire . . . . . page 168

Target population: Adults or Adolescents

RESPECT FOR ONE'S BODY

Individuals are willing to engage in those activities that are indicative of a respect for their body and the need to take care of it.

My Body . . . . . page 113

Target population: Elementary school children

Health Attitudes . . . . . page 170

Target population: Adults or Adolescents

CHAPTER FIVE

MEASURES DEVELOPED FOR THIS PROJECT

This chapter contains all of the measures that have been newly developed to correspond to the program outcome statements listed in Chapter Four. The measures are presented in the same order as the outcome statements, that is, the behavioral measure is followed by measures of knowledge, skill, and affect. The adult/adolescent version of each measure is presented first. In those instances where a children's measure has also been developed for an outcome, that measure follows immediately after the adult form.

A descriptor page precedes each measure. This page indicates the type of measure (behavioral, knowledge, skill, or affective), the title of the outcome assessed, and the target population for the instrument. A general description is presented, providing an overview of the assessment strategy employed in the measure. Finally, the pages in the handbook where the test specifications for the measure can be found are also cited.

All of the measures in this chapter have been readied for possible photocopying, with directions to respondents printed at the top of the first page of each instrument. Scoring instructions follow all knowledge, skill, and affective measures.

WEEKLY ACTIVITIES INDEX

TYPE OF MEASURE: Behavioral

OUTCOME ASSESSED: Maintenance of an Acceptable Activity Level

TARGET POPULATION: Adults or Adolescents

GENERAL DESCRIPTION:

Individuals are asked about the frequency, duration, and intensity of their participation in planned exercise activities during the preceding week. Responses to this survey can be used to measure the extent to which individuals maintain an activity level sufficient to promote cardiorespiratory fitness as well as muscular strength and endurance and flexibility.

ADDITIONAL INFORMATION:

Test specifications for this measure can be found on pages 176-179.

WEEKLY ACTIVITIES INDEX

Various activities are listed on the next page. For each activity in which you participated during the past week please record the following:

In the FREQUENCY column: Indicate the number of different times you participated in this activity during the past WEEK.

In the AVERAGE DURATION column: Indicate the average amount of time (in minutes) that you spent per session.

In the INTENSITY column: Indicate how strenuous, on average, the activity was for you, that is, how much effort it required. Record your answer in the INTENSITY column using one of the following letters:

L = Light activity (Small increase in heart and breathing rate)

M = Medium activity (Some increase in heart and breathing rate)

H = Heavy activity (Large increase in heart and breathing rate)

If you participated in other exercise activities that are not included on this list, please write them in the spaces labeled "Other." Fill out the FREQUENCY, AVERAGE DURATION, and INTENSITY columns for each activity you add.

Weekly Activities Index
Page 2

ACTIVITY	FREQUENCY (number/week)	AVERAGE DURATION (minutes)	INTENSITY (L, M, H)
Badminton			
Baseball/softball			
Basketball			
Bicycling			
Bowling			
Calisthenics (general exercises)			
Dancing (Type: _____)			
Football			
Golf (with a cart?____)			
Handball/racquetball/squash			
Hiking			
Jogging/running			
Judo/karate			
Rope skipping			
Rowing			
Skating			
Skiing (Type: _____)			
Soccer			
Stretching			
Swimming			
Tennis			
Volleyball			
Walking (for exercise)			
Weight training			
Wrestling			
Yoga			
Other: _____			
Other: _____			

FACTS ABOUT EXERCISE

TYPE OF MEASURE: Knowledge

OUTCOME ASSESSED: Effects of Exercise

TARGET POPULATION: Adults or Adolescents

GENERAL DESCRIPTION:

Individuals are presented with statements about physiological, psychological, and sociological effects of exercise. Individuals indicate whether each statement is true or false.

ADDITIONAL INFORMATION:

Test specifications for this measure can be found on pages 180-189.

FACTS ABOUT EXERCISE

This test consists of 20 statements about the effects of exercise. Some of the statements are true and some are false. If you think a statement is true, put a check in the column labeled TRUE. If you think a statement is false, put a check in the column labeled FALSE.

TRUE	FALSE		
____	____	1.	People who are muscularly fit are automatically also cardiovascularly fit.
____	____	2.	Regular exercise increases the heart rate at rest.
____	____	3.	If the frequency, intensity, and/or duration of an exercise program are progressively increased, cardiovascular improvement may continue for several years.
____	____	4.	A single exercise session can have a lasting effect on the cardiovascular system.
____	____	5.	Muscles that are not exercised turn into fat.
____	____	6.	Regular exercise usually increases a person's resting blood pressure.
____	____	7.	Regular exercise can strengthen the bones.
____	____	8.	Regular exercise may help prevent and relieve lower back muscle pain.
____	____	9.	Regular exercise has no effect on the body's ability to use fat.
____	____	10.	Regular exercise combined with dieting is a more effective way to reduce fat than just dieting.

TRUE	FALSE		
___	___	11.	The number of calories burned during exercise depends only on the duration of the activity.
___	___	12.	A heavier person uses more calories than a lighter person during comparable exercise periods.
___	___	13.	Underwater weighing is the most accurate way to measure an individual's body composition.
___	___	14.	Regular exercise decreases the maximum amount of oxygen the body can process while exercising.
___	___	15.	A person's physical fitness refers to how that person's body looks.
___	___	16.	Physically active individuals are less likely than inactive individuals to have a heart attack.
___	___	17.	Regular exercise can slow down the natural decline in lung capacity.
___	___	18.	Experts believe that there is no relationship between physical fitness and work performance.
___	___	19.	Exercise can provide an opportunity to make new friends.
___	___	20.	Participation in a regular exercise program can improve one's ability to fall asleep quickly.

SCORING KEY
FACTS ABOUT EXERCISE

Item	Answer
1	F
2	F
3	T
4	F
5	F
6	F
7	T
8	T
9	F
10	T
11	F
12	T
13	T
14	F
15	F
16	T
17	T
18	F
19	T
20	T

EXERCISE FACTS

TYPE OF MEASURE: Knowledge

OUTCOME ASSESSED: Effects of Exercise

TARGET POPULATION: Elementary school children

GENERAL DESCRIPTION:

Children are presented with statements about physical, psychological, and social effects of exercise. Children indicate whether each statement is true or false.

ADDITIONAL INFORMATION:

Test specifications for this measure can be found on pages 190-198.

EXERCISE FACTS

This test has 15 statements about exercise. If the sentence is correct, put a check under the word TRUE. If the sentence is incorrect, put a check under the word FALSE.

TRUE	FALSE		
____	____	1.	Fitness means how a person's body looks, not how well the heart and other parts of the body work.
____	____	2.	Experts agree that exercise can help keep a person from becoming sick.
____	____	3.	Regular exercise helps the heart beat more quickly at rest.
____	____	4.	If a person keeps exercising more often, harder, or longer, the fitness of the heart may continue to improve for years.
____	____	5.	Exercising even once will help the heart.
____	____	6.	Regular exercise can help a person feel less muscular soreness and stiffness.
____	____	7.	Regular exercise can help make bones stronger.
____	____	8.	Good posture as a child can help a person avoid back pains as an adult.
____	____	9.	Muscles that are not exercised turn into fat.
____	____	10.	Exercise makes the body use up fewer calories.
____	____	11.	With regular exercise, a person becomes able to get the same amount of air with fewer breaths.
____	____	12.	Regular exercise lets the body use more oxygen while exercising.
____	____	13.	Regular exercise keeps the lungs healthier as a person gets older.
____	____	14.	People with breathing problems should never exercise.
____	____	15.	Regular exercise can help people feel better about themselves.

SCORING KEY
EXERCISE FACTS

Item	Answer
1	F
2	T
3	F
4	T
5	F
6	T
7	T
8	T
9	F
10	F
11	T
12	T
13	T
14	F
15	T

DESIGNING AN EXERCISE PROGRAM

TYPE OF MEASURE: Knowledge

OUTCOME ASSESSED: Exercise Program Design

TARGET POPULATION: Adults or Adolescents

GENERAL DESCRIPTION:

Individuals are presented with statements about exercise program components and the factors relating to activity selection and implementation. Individuals indicate whether each statement is true or false.

ADDITIONAL INFORMATION:

Test specifications for this measure can be found on pages 199-207.

DESIGNING AN EXERCISE PROGRAM

This test consists of 20 statements about exercise program design. Some of the statements are true and some are false. If you think a statement is true, put a check in the column labeled TRUE. If you think a statement is false, put a check in the column labeled FALSE.

TRUE	FALSE		
___	___	1.	Participating in an activity program where everyone exercises at the same level of intensity can be dangerous.
___	___	2.	An individual's exercise program need not specify the length of each exercise session.
___	___	3.	A conditioning program is used only for building muscular strength and fitness.
___	___	4.	Flexibility is the ability to move a particular joint in the body through its full range of motion.
___	___	5.	The benefits gained from exercise depend, in part, on the number of days per week that a person exercises.
___	___	6.	Individuals who exercise regularly will reach a point where their fitness level does not increase unless they increase the frequency, duration, or intensity of their activity.
___	___	7.	All individuals should see a doctor before starting an exercise program.
___	___	8.	An exercise program should include a warm-up period.
___	___	9.	Warm-up exercises will have little effect on the muscle and joint soreness often felt when first starting an exercise program.

TRUE	FALSE		
____	____	10.	Cool-down activities help relieve current soreness and prevent future soreness.
____	____	11.	The target level for a healthy person building cardiorespiratory endurance is 90 to 100% of one's maximum heart rate.
____	____	12.	Cardiorespiratory endurance refers to the ability of the body to perform rhythmical exercise for very short periods of time.
____	____	13.	Cardiorespiratory endurance activities must be repeated at least three times per week in order to get the most benefit.
____	____	14.	Swimming has little effect on one's cardiorespiratory endurance capacity.
____	____	15.	Muscular strength is the ability to move a heavy weight many times.
____	____	16.	All sports and activities provide the same benefits.
____	____	17.	Playing volleyball regularly improves one's cardiorespiratory endurance capacity.
____	____	18.	Once cardiorespiratory fitness has been achieved, it is generally safe to exercise five or six times a week.
____	____	19.	Individuals exercising below their target heart rates show little improvement in cardiorespiratory fitness.
____	____	20.	Bicycling can improve one's cardiorespiratory endurance capacity.

SCORING KEY

DESIGNING AN EXERCISE PROGRAM

Item	Answer
1	T
2	F
3	F
4	T
5	T
6	T
7	F
8	T
9	F
10	T
11	F
12	F
13	T
14	F
15	F
16	F
17	F
18	T
19	T
20	T

INJURY PREVENTION

TYPE OF MEASURE: Knowledge

OUTCOME ASSESSED: Injury Prevention

TARGET POPULATION: Adults or Adolescents

GENERAL DESCRIPTION:

Individuals are presented with statements about exercise-related health risks and injury prevention strategies associated with cardiovascular, muscular/skeletal, and environmental problems. Individuals indicate whether each statement is true or false.

ADDITIONAL INFORMATION:

Test specifications for this measure can be found on pages 208-216.

INJURY PREVENTION

This test consists of 20 statements about exercise and injury prevention. Some of the statements are true and some are false. If you think a statement is true, put a check in the column labeled TRUE. If you think a statement is false, put a check in the column labeled FALSE.

TRUE	FALSE		
___	___	1.	Sweat evaporates quickly during exercise in humid weather.
___	___	2.	The intensity and duration of exercise are factors which can influence the development of heat stress.
___	___	3.	Each person responds differently to exercising in the heat because of differences in amounts of body fat, the number of sweat glands, and fitness level.
___	___	4.	The chances of developing heat disorders decrease if a person wears a sweat shirt and sweat pants while exercising in hot weather.
___	___	5.	Individuals should start an exercise program with very rigorous activities.
___	___	6.	Dehydration or the loss of body fluids is the major cause of heat disorders.
___	___	7.	A person should not drink large quantities of liquids before exercising in the heat.
___	___	8.	Body fluids lost during exercise can only be replaced with special electrolyte solutions.
___	___	9.	Cool-down exercises reduce the risk of muscle cramps.

TRUE	FALSE		
____	____	10.	Cold stress occurs when the body loses heat more slowly than it is produced.
____	____	11.	Exercising in cold weather is generally a greater health risk than exercising in hot weather.
____	____	12.	Exercising in low temperatures can lead to hypothermia.
____	____	13.	Individuals who exercise on cold days should not wear a hat.
____	____	14.	Until the individual adapts to the altitude, exercise at high altitudes reduces performance capabilities.
____	____	15.	Muscular injuries often occur when improper exercise techniques are used.
____	____	16.	Learning the proper ways to move and position the body in playing a game can help prevent muscular injuries.
____	____	17.	Warm-up exercises are a frequent cause of muscle strain.
____	____	18.	Individuals should call a doctor immediately if they have pain in the left or midchest area during or just after exercising.
____	____	19.	Being in the proper physical condition to handle the physical stress of a particular exercise program does little to prevent the onset of cardiovascular problems.
____	____	20.	During an exercise session individuals should gradually increase the intensity of activity to prevent the possible onset of cardiovascular problems.

SCORING KEY
INJURY PREVENTION

Item	Answer
1	F
2	T
3	T
4	F
5	F
6	T
7	F
8	F
9	T
10	F
11	F
12	T
13	F
14	T
15	T
16	T
17	F
18	T
19	F
20	T

AVOIDING INJURY

TYPE OF MEASURE: Knowledge

OUTCOME ASSESSED: Injury Prevention

TARGET POPULATION: Elementary school children

GENERAL DESCRIPTION:

Children are presented with statements about the nature of exercise-related health risks and injury prevention strategies associated with cardiovascular, muscular/skeletal, and environmental problems. Children indicate whether each statement is true or false.

ADDITIONAL INFORMATION:

Test specifications for this measure can be found on pages 217-225.

AVOIDING INJURY

This test has 15 sentences. Read each one. If the sentence is correct, put a check under the word TRUE. If the sentence is incorrect, put a check under the word FALSE.

TRUE	FALSE		
___	___	1.	Much of the heat built up by the body during exercise escapes as sweat.
___	___	2.	A person who exercises or plays in very cold weather should wear a hat.
___	___	3.	Heat exhaustion happens when the body sweats more than it needs to.
___	___	4.	Hot, dry skin is a sign of heat stroke.
___	___	5.	At first, exercise at a high altitude is easier than exercise at a low altitude.
___	___	6.	Heat stroke can lead to death.
___	___	7.	When a person is exercising, pounding in the head can be an early warning sign of heat problems.
___	___	8.	A person should drink very little liquid before exercising in the heat.
___	___	9.	When the body begins to lose heat faster than it can be built up, cold stress can happen.

TRUE	FALSE		
____	____	10.	A fast heart rate is one sign of altitude sickness.
____	____	11.	People with big muscles have little chance of having problems while exercising in the heat.
____	____	12.	Following the rules of a game can help a person avoid injuries.
____	____	13.	Warm-up exercises slow down the flow of blood to the heart.
____	____	14.	Cool-down exercises cause the blood to stop flowing to the muscles.
____	____	15.	During exercise or play, people should start at their highest level of activity.

SCORING KEY
AVOIDING INJURY

Item	Answer
1	T
2	T
3	F
4	T
5	F
6	T
7	T
8	F
9	T
10	T
11	F
12	T
13	F
14	F
15	F

SELECTING AN EXERCISE PROGRAM

TYPE OF MEASURE: Skill

OUTCOME ASSESSED: Program Design

TARGET POPULATION: Adults or Adolescents

GENERAL DESCRIPTION:

Individuals are presented with personal physical fitness goals for fictitious persons. Individuals are asked to select from among four possible plans the exercise program most appropriate to each described person's physical fitness goal. The correct choice will be an exercise program that consists of activities that are appropriate in type, duration, frequency, and intensity to attain the personal physical fitness goal for the person described.

ADDITIONAL INFORMATION:

Test specifications for this measure can be found on pages 226-230.

SELECTING AN EXERCISE PROGRAM

This test presents descriptions of individuals who want to select an exercise program that will meet their personal physical fitness goals. All individuals have their doctor's approval to start such a program. Read each description. Then put a check (√) in the box under the plan that is most appropriate to achieve the fitness goal given.

1. Name: Rose Wheaton
   Age: 37
   Fitness goal: cardiorespiratory endurance

Put a check in the box under the plan that is most appropriate for Rose:

	PLAN A	PLAN B	PLAN C	PLAN D
Cardiorespiratory activity:	Tennis	Calis-thenics	Bicycling	Badminton
Number of sessions per week:	2	4	3	3
Length of each session:	60 min.	30 min.	15 min.	30 min.
Target heartrate (for 10 seconds):	18-21	14-17	14-17	22-25
Other activities:	-	-	-	-
(Check answer here)	☐	☐	☐	☐

2. Name: Ray Grand
Age: 29
Fitness goal: cardiorespiratory endurance and muscular strength and endurance

Put a check in the box under the plan that is most appropriate for Ray:

	PLAN A	PLAN B	PLAN C	PLAN D
Cardiorespiratory activity:	Volley-ball	Bicycling	Jogging	Swimming
Number of sessions per week:	3	3	2	4
Length of each session:	30 min.	20 min.	20 min.	30 min.
Target heartrate (for 10 seconds):	21-25	19-21	29-32	30-34
Other activities:	Stretching	-	Weight training	-
(Check answer here)	☐	☐	☐	☐

3. Name: Donna White
Age: 58
Fitness goal: cardiorespiratory endurance and flexibility

Put a check in the box under the plan that is most appropriate for Donna:

	PLAN A	PLAN B	PLAN C	PLAN D
Cardiorespiratory activity:	Bicycling	Tennis	Jogging	Swimming
Number of sessions per week:	4	3	3	4
Length of each session:	20 min.	30 min.	20 min.	25 min.
Target heartrate (for 10 seconds):	26-30	21-23	18-20	17-22
Other activities:	Yoga	-	Golf	-
(Check answer here)	☐	☐	☐	☐

4. Name: Anne Lawry
Age: 22
Fitness goal: cardiorespiratory endurance

Put a check in the box under the plan that is most appropriate for Anne:

	PLAN A	PLAN B	PLAN C	PLAN D
Cardiorespiratory activity:	Jogging	Skating	Rope skipping	Weight training
Number of sessions per week:	3	2	3	3
Length of each session:	20 min.	20 min.	25 min.	25 min.
Target heartrate (for 10 seconds):	20-24	25-27	30-34	16-18
Other activities:	-	-	-	-
(Check answer here)	☐	☐	☐	☐

5. Name: Charles Jager
Age: 41
Fitness goal: cardiorespiratory endurance and muscular strength and endurance

Put a check in the box under the plan that is most appropriate for Charles:

	PLAN A	PLAN B	PLAN C	PLAN D
Cardiorespiratory activity:	Weight training	Racquetball	Running	Badminton
Number of sessions per week:	4	3	3	2
Length of each session:	20 min.	30 min.	25 min.	20 min.
Target heartrate (for 10 seconds):	15-17	20-23	27-30	19-24
Other activities:	-	-	Karate	Judo
(Check answer here)	☐	☐	☐	☐

6. Name: Luis Carlos
Age: 17
Fitness goal: cardiorespiratory endurance

Put a check in the box under the plan that is most appropriate for Luis:

	PLAN A	PLAN B	PLAN C	PLAN D
Cardiorespiratory activity:	Badminton	Calisthenics	Handball	Rowing
Number of sessions per week:	1	3	4	3
Length of each session:	40 min.	20 min.	20 min.	20 min.
Target heartrate (for 10 seconds):	23-26	14-17	22-27	31-33
Other activities:	-	-	-	-
(Check answer here)	☐	☐	☐	☐

7. Name: Gwen Harrington
Age: 20
Fitness goal: cardiorespiratory endurance

Put a check in the box under the plan that is most appropriate for Gwen:

	PLAN A	PLAN B	PLAN C	PLAN D
Cardiorespiratory activity:	Yoga	Walking	Rope skipping	Running
Number of sessions per week:	3	4	5	6
Length of each session:	30 min.	20 min.	10 min.	15 min.
Target heartrate (for 10 seconds):	14-17	23-25	27-29	31-33
Other activities:	-	-	-	-
(Check answer here)	☐	☐	☐	☐

8. Name: David Johnson
Age: 30
Fitness goal: cardiorespiratory endurance

Put a check in the box under the plan that is most appropriate for David:

	PLAN A	PLAN B	PLAN C	PLAN D
Cardiorespiratory activity:	Baseball	Swimming	Tennis	Squash
Number of sessions per week:	2	3	1	4
Length of each session:	60 min.	30 min.	60 min.	25 min.
Target heartrate (for 10 seconds):	13-16	29-32	23-25	24-27
Other activities:	-	Volleyball	-	-
(Check answer here)	☐	☐	☐	☐

9. Name: Gloria Mays
Age: 49
Fitness goal: cardiorespiratory endurance

Put a check in the box under the plan that is most appropriate for Gloria:

	PLAN A	PLAN B	PLAN C	PLAN D
Cardiorespiratory activity:	Jogging	Rope skipping	Swimming	Walking
Number of sessions per week:	3	3	3	2
Length of each session:	20 min.	10 min.	20 min.	20 min.
Target heartrate (for 10 seconds):	27-29	21-24	20-22	23-25
Other activities:	-	-	-	-
(Check answer here)	☐	☐	☐	☐

10. Name: Henry Monroe
Age: 61
Fitness goal: cardiorespiratory endurance and flexibility

Put a check in the box under the plan that is most appropriate for Henry:

	PLAN A	PLAN B	PLAN C	PLAN D
Cardiorespiratory activity:	Bowling	Bicycling	Swimming	Walking
Number of sessions per week:	3	2	4	4
Length of each session:	30 min.	20 min.	25 min.	25 min.
Target heartrate (for 10 seconds):	12-14	18-20	25-27	16-18
Other activities:	Calis-thenics	-	-	Stretching
(Check answer here)	☐	☐	☐	☐

11. Name: Joe Leonard
Age: 56
Fitness goal: cardiorespiratory endurance

Put a check in the box under the plan that is most appropriate for Joe:

	PLAN A	PLAN B	PLAN C	PLAN D
Cardiorespiratory activity:	Swimming	Bicycling	Rowing	Soccer
Number of sessions per week:	3	3	2	3
Length of each session:	20 min.	15 min.	15 min.	20 min.
Target heartrate (for 10 seconds):	16-18	17-19	21-23	25-28
Other activities:	-	-	-	-
(Check answer here)	☐	☐	☐	☐

12. Name: Sylvia Rapp
Age: 48
Fitness goal: cardiorespiratory endurance and muscular strength and endurance

Put a check in the box under the plan that is most appropriate for Sylvia:

	PLAN A	PLAN B	PLAN C	PLAN D
Cardiorespiratory activity:	Walking	Jogging	Calisthenics	Swimming
Number of sessions per week:	2	3	4	3
Length of each session:	20 min.	20 min.	15 min.	25 min.
Target heartrate (for 10 seconds):	13-15	20-23	13-15	12-15
Other activities:	-	-	Golf	Weight training
(Check answer here)	☐	☐	☐	☐

13. Name: Denise Strom
Age: 51
Fitness goal: cardiorespiratory endurance

Put a check in the box under the plan that is most appropriate for Denise:

	PLAN A	PLAN B	PLAN C	PLAN D
Cardiorespiratory activity:	Bicycling	Bowling	Calisthenics	Skating
Number of sessions per week:	3	3	3	3
Length of each session:	20 min.	40 min.	10 min.	25 min.
Target heartrate (for 10 seconds):	19-21	13-15	14-16	26-28
Other activities:	-	-	-	-
(Check answer here)	☐	☐	☐	☐

14. Name: Arthur Wingerski
Age: 33
Fitness goal: cardiorespiratory endurance and flexibility

Put a check in the box under the plan that is most appropriate for Arthur:

	PLAN A	PLAN B	PLAN C	PLAN D
Cardiorespiratory activity:	Jogging	Walking	Rowing	Basketball
Number of sessions per week:	2	2	3	3
Length of each session:	20 min.	20 min.	20 min.	25 min.
Target heartrate (for 10 seconds):	20-24	15-17	20-24	20-22
Other activities:	Wrestling	Karate	Yoga	Weight training
(Check answer here)	☐	☐	☐	☐

15. Name: Victor Lindquist
Age: 59
Fitness goal: cardiorespiratory endurance

Put a check in the box under the plan that is most appropriate for Victor:

	PLAN A	PLAN B	PLAN C	PLAN D
Cardiorespiratory activity:	Hiking	Handball	Rope skipping	Weight training
Number of sessions per week:	3	2	3	3
Length of each session:	60 min.	20 min.	15 min.	20 min.
Target heartrate (for 10 seconds):	16-20	19-21	16-18	12-14
Other activities:	-	-	-	-
(Check answer here)	☐	☐	☐	☐

SCORING KEY

SELECTING AN EXERCISE PROGRAM

Item	Answer
1	D
2	B
3	D
4	A
5	B
6	C
7	B
8	D
9	C
10	D
11	A
12	B
13	A
14	C
15	A

INCORRECT ANSWER CHOICE ANALYSES

Item	Excessive Intensity	Insufficient			Inappropriate Activity for		
		Intensity	Frequency	Duration	Cardio-respiratory Endurance	Muscular Strength Endurance	Flexibility
1		B, C	A	C	B		
2	C, D		C		A	A	
3	A						B, C
4	C	D	B		D		
5	C	A	D		A		
6	D	B	A		B		
7	D	A		C, D	A		
8	B	A	A, C		A		
9	A		D	B			
10	C	A	B		A		B
11	D		C	B, C			
12		A, C, D	A	C	C	C	
13	D	B, C		C	B, C		
14		B	A, B		D		A, D
15		D	B	C	D		

PREVENTING AND CARING FOR INJURIES

TYPE OF MEASURE: Skill

OUTCOME ASSESSED: Avoidance and Care of Injuries

TARGET POPULATION: Adults or Adolescents

GENERAL DESCRIPTION:

Individuals are presented with brief descriptions of situations in which a person wants to act to prevent or care for an exercise-related injury. Individuals select from among three possible options an appropriate course of action or indicate that none of the suggested options is appropriate.

ADDITIONAL INFORMATION:

Test specifications for this measure can be found on pages 231-239.

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PREVENTING AND CARING FOR INJURIES

This test presents descriptions of individuals who want to prevent or care for exercise-related injuries. Read each description. Circle the letter of the appropriate action for the individual to take. If there is no choice presented that is appropriate, circle Choice D, "None of the above."

1. Jane had no difficulty sleeping before she started an exercise program. However, now she is troubled with insomnia. She would like to treat her sleep problem. An appropriate action for Jane to take would be to:

   A. Increase the intensity and duration of her exercise program.

   B. Reduce the intensity and duration of her exercise program.

   C. Avoid eating for at least two hours before exercising.

   D. None of the above.

2. Brian has begun a running exercise program and wants to prevent tendinitis in his ankles. An appropriate action for Brian to take would be to:

   A. Perform warm-up exercises before running.

   B. Perform cool-down exercises after running.

   C. Run in an area that is free of obstacles and traffic.

   D. None of the above.

3. Suzanne began a bicyling exercise program two weeks ago. Recently she has felt nauseous after exercising. She wants to act safely. An appropriate action for Suzanne to take would be to:

   A. Perform warm-up exercises for a longer time before bicycling.

   B. Increase the intensity but reduce the duration of the bicycling.

C. Reduce the intensity of the bicycling and prolong the cool-down period.

D. None of the above.

4. Art is going cross-country skiing for the afternoon. He wants to prevent hypothermia. An appropriate action for Art to take would be to:

A. Wear a thick layer of loosely-woven clothing, protective goggles, and knitted gloves.

B. Wear several thin layers of tightly-woven clothing, a hat, and mittens.

C. Perform warm-up and cool-down exercises.

D. None of the above.

5. Hilda has been jogging regularly for several months. She has just noticed bursts of rapid heartbeats while jogging. She wants to act safely. An appropriate action for Hilda to take would be to:

A. Stop jogging for several days, then resume jogging at a slower pace.

B. Reduce the intensity of the jogging and prolong the cool-down period.

C. Reduce the intensity and the duration of the jogging.

D. None of the above.

6. Corrine is beginning a rowing exercise program. She wants to prevent heat disorders. An appropriate action for Corrine to take would be to:

A. Wear light, loose clothing and drink water freely.

B. Take salt tablets and perform cool-down exercises after rowing.

C. Wear waterproof clothing and perform sufficient warm-up exercises before rowing.

D. None of the above.

7. Jim is suffering from tendinitis in his elbow due to playing tennis. He wants to treat the condition. An appropriate action for Jim to take would be to:

   A. Apply heat to his elbow.

   B. Massage his elbow.

   C. Apply ice to his elbow.

   D. None of the above.

8. Tina's toes became frostbitten while she was hiking. She wants to treat the frostbite. An appropriate action for Tina to take would be to:

   A. Apply ointment and bandages to her toes.

   B. Put her feet in cold water.

   C. Put her feet in lukewarm water.

   D. None of the above.

9. Frank wants to prevent dislocating his shoulder while playing football. An appropriate action for Frank to take would be to:

   A. Perform warm-up exercises for 15 to 20 minutes before the game starts.

   B. Use appropriate protective clothing and equipment and proper playing techniques.

   C. Perform cool-down exercises for 15 to 20 minutes after the game is over.

   D. None of the above.

10. Carlos becomes extremely breathless while playing handball. His breathlessness continues for 15 to 20 minutes after he stops playing. He wants to act safely. An appropriate action for Carlos to take would be to:

    A. Continue to play vigorously but shorten his playing time.

    B. Prolong his warm-up period.

    C. Prolong his cool-down period.

    D. None of the above.

11. Sandra plays racquetball regularly. She just contracted viral influenza and wants to prevent a viral infection of the heart muscle. An appropriate action for Sandra to take would be to:

    A. Stop exercising until several days after she has fully recovered from the influenza.

    B. Play racquetball for only half the usual length of time while she is recovering.

    C. Play racquetball at a lower than usual level of intensity while she is recovering.

    D. None of the above.

12. Jose is bicycling in the afternoon with his friends. He begins to feel dizzy, weak, and breathless, and his pulse is very rapid. An appropriate action for Jose to take would be to:

    A. Rest until his pulse is normal and then ride home.

    B. Drink plenty of liquids before riding home.

    C. Ride more slowly the rest of the way.

    D. None of the above.

13. Rose sprained her ankle while exercising in a gymnastics program. She wants to act safely. An appropriate action for Rose to take would be to:

    A. Massage her ankle gently.

    B. Sit with her ankle raised and apply hot towels to it.

    C. Sit with her ankle raised and apply ice to it.

    D. None of the above.

14. Michael wants to avoid cardiovascular problems as he begins a swimming exercise program. An appropriate action for Michael to take would be to:

    A. Swim only in a heated pool.

    B. Build up slowly to his target fitness level.

    C. Take swimming lessons to improve his form.

    D. None of the above.

15. Peter feels bursitis in his shoulder each time he pitches for his baseball team. He wants to act safely. An appropriate action for Peter to take would be to:

    A. Rest his shoulder and apply ice to it.

    B. Alternate hot and cold compresses until the pain stops.

    C. Apply pressure to his shoulder and then tape it.

    D. None of the above.

SCORING KEY

PREVENTING AND CARING FOR INJURIES

Item	Answer
1	B
2	A
3	C
4	B
5	D
6	A
7	C
8	C
9	B
10	D
11	A
12	D
13	C
14	B
15	A

INCORRECT ANSWER CHOICE ANALYSES

The incorrect answer choice for each item are listed below using the following method of annotation.

Direct violation - a response that is a direct violation of an appropriate action.

Ineffective - a response that is ineffective in avoiding or caring for the injury described.

Incorrect - the response "None of the above" when a correct response is provided as one of the other response options.

Item	Direct Violation	Ineffective	Incorrect
1	A	C	D
2		B, C	D
3	B	A	D
4		A, C	D
5	A, B, C		
6	C	B	D
7	A	B	D
8	B	A	D
9		A, C	D
10	A	B, C	
11	B, C		D
12	A, B, C		
13	B	A	D
14		A,C	D
15	B	C	D

EXERCISING SAFELY

TYPE OF MEASURE: Skill

OUTCOME ASSESSED: Avoidance and Care of Injuries

TARGET POPULATION: Elementary school children

GENERAL DESCRIPTION:

Children are presented with brief descriptions of situations in which a person should act to prevent or care for an exercise-related injury. Children select from among three possible options the best action for the person to take.

ADDITIONAL INFORMATION:

Test specifications for this measure can be found on pages 240-247.

EXERCISING SAFELY

This test tells about people who want to prevent or care for an exercise injury. Read each question. Then circle the letter of the best action for the person to take.

1. Tony rides a skateboard. He wants to prevent scrapes. The best action for Tony to take is to:

   A. Wear protective clothing.

   B. Do warm-up and cool-down exercises.

   C. Use his skateboard on the sidewalk only.

2. Donna has begun ice skating. She notices that she is out of breath for about fifteen minutes after skating. She wants to act safely. The best action for Donna to take is to:

   A. Make sure not to eat anything right before skating.

   B. Stop doing cool-down exercises after skating.

   C. Skate less hard so that she can talk while skating.

3. Leon's toes became frostbitten while he was cross-country skiing. He wants to take care of his frostbite. The best action for Leon to take is to:

   A. Rub his toes with ice or snow.

   B. Warm his toes by holding them in his hands.

   C. Put his toes in the hottest water that he can stand.

4. Anita is going hiking on a very warm day. She wants to prevent heat exposure. The best action for Anita to take is to:

   A. Walk very quickly so that she will feel the breeze.

   B. Wear loose, light clothing and drink plenty of water.

   C. Do cool-down exercises as soon as the hike is over.

5. Jeff pitches for his baseball team. He wants to prevent swelling of his wrist. The best action for Jeff to take is to:

   A. Do warm-up exercises before playing.

   B. Put ice on his wrist before playing.

   C. Rub his wrist during the game.

6. Karen plays soccer. She wants to keep from spraining her ankles. The best action for Karen to take is to:

   A. Play in a clear area and wear correctly fitted shoes.

   B. Perform cool-down exercises at the end of the game.

   C. Drink plenty of water before playing.

7. Angela is sunburned from playing volleyball in the sun all afternoon. She wants to treat her sunburn. The best action for Angela to take is to:

   A. Put cool water on her sunburn.

   B. Rub her skin with cloths dipped in hot water.

   C. Wash her skin with soap and water.

8. Gary has a blister on his heel from running. He wants to treat the blister. The best action for Gary to take is to:

   A. Put ice on the blister.

   B. Put a bandage on the blister.

   C. Keep the blister uncovered.

9. Juan swims regularly. He has started feeling very tired after swimming. He wants to act safely. The best action for Juan to take is to:

   A. Swim harder to wake himself up.

   B. Swim in colder water.

   C. Swim for a shorter period of time.

10. Ray scraped his knees while roller skating. He wants to care for his knees. The best action for Ray to take is to:

    A. Wash and bandage his knees.

    B. Leave his knees uncovered.

    C. Put heat on his knees.

SCORING KEY

EXERCISING SAFELY

Item	Answer
1	A
2	C
3	B
4	B
5	A
6	A
7	A
8	B
9	C
10	A

INCORRECT ANSWER CHOICE ANALYSES

The incorrect answer choices for each item are listed below using the following method of annotation:

Direction violation = an action that is a direct violation of an appropriate action.

Ineffective = an action that is ineffective in preventing or caring for the injury described.

Item	Direction Violation	Ineffective
1		B, C
2	B	A
3	A, C	
4	A	C
5		B, C
6		B, C
7	B	C
8	C	A
9	A	B
10	B	C

EFFECTS OF EXERCISE

TYPE OF MEASURE: Affective

OUTCOME ASSESSED: Belief in Positive Effects of Exercise

TARGET POPULATION: Adults or Adolescents

GENERAL DESCRIPTION:

This inventory is a Likert scale in which respondents are asked to register their degree of agreement with a series of statements about the possible effects of exercise on a person's body image, sexuality, coordination, strength, social acceptability, personal adjustment, self-concept, ability to manage stress, and health.

ADDITIONAL INFORMATION:

Test specifications for this measure can be found on pages 248-250.

EFFECTS OF EXERCISE

This survey describes some possible effects of regular exercise. Please respond to all the statements in the survey.

Read each statement. Decide the extent to which you agree with it. Circle the appropriate letter to the left of the statement. Use the following scale:

SA	=	**Strongly Agree**
A	=	**Agree**
U	=	**Uncertain**
D	=	**Disagree**
SD	=	**Strongly Disagree**

SA A U D SD 1. Exercise is helpful in reducing anxiety.

SA A U D SD 2. People who exercise have more satisfying sexual relationships than people who don't exercise.

SA A U D SD 3. Exercise does nothing to improve a person's coordination.

SA A U D SD 4. People who exercise are healthier than people who don't exercise.

SA A U D SD 5. Exercise does not increase a person's physical strength.

SA A U D SD 6. Exercise does not make a person more socially accepted.

SA A U D SD 7. People who exercise are more likely to feel good about themselves than people who don't exercise.

SA A U D SD 8. Exercise decreases a person's sexual satisfaction.

SA	A	U	D	SD	9.	People who exercise are stronger than people who don't.
SA	A	U	D	SD	10.	People who exercise like the way their bodies look.
SA	A	U	D	SD	11.	Exercise makes it easier for a person to adjust to life.
SA	A	U	D	SD	12.	People who exercise are well accepted in social situations.
SA	A	U	D	SD	13.	Exercise does nothing to reduce stress.
SA	A	U	D	SD	14.	People who exercise are no happier with the way their bodies look than people who don't exercise.
SA	A	U	D	SD	15.	People who exercise have better physical coordination than people who don't exercise.
SA	A	U	D	SD	16.	Exercise does nothing to help people like themselves.
SA	A	U	D	SD	17.	People who exercise get sick just as often as people who don't exercise.
SA	A	U	D	SD	18.	Exercising does not help a person to be better adjusted.

INSTRUCTIONS FOR SCORING
EFFECTS OF EXERCISE

Point values are assigned to responses according to the following scoring key.

SCORING KEY

	SA	A	U	D	SD
1.	5	4	3	2	1
2.	5	4	3	2	1
3.	1	2	3	4	5
4.	5	4	3	2	1
6.	1	2	3	4	5
7.	5	4	3	2	1
8.	1	2	3	4	5
9.	5	4	3	2	1
10.	5	4	3	2	1
11.	5	4	3	2	1
12.	5	4	3	2	1
13.	1	2	3	4	5
14.	1	2	3	4	5
15.	5	4	3	2	1
16.	1	2	3	4	5
17.	1	2	3	4	5
18.	1	2	3	4	5

This inventory can be scored by adding the point value of every response and dividing this sum by the number of responses. The maximum score attainable of 5 points indicates a strong belief in the positive effects of exercise on body image, sexuality, coordination, strength, social acceptability, personal adjustment, self-concept, ability to manage stress, and health.

In addition to an overall score for this outcome, responses can be considered separately as follows:

Area	Items
Body image	10, 14
Sexuality	2, 8
Coordination	3, 15
Strength	5, 9
Social acceptability	6, 12
Personal adjustment	11, 18
Self-concept	7, 16
Stress management	1, 13
Health	4, 17

EXERCISE AND PEOPLE

TYPE OF MEASURE: Affective

OUTCOME ASSESSED: Belief in Positive Effects of Exercise

TARGET POPULATION: Elementary school children

GENERAL DESCRIPTION:

This inventory is a Likert scale in which children are asked to register their degree of agreement with a series of statements about the possible effects of exercise on a person's body image, coordination, strength, social acceptability, self-concept, ability to manage stress, and health.

ADDITIONAL INFORMATION:

Test specifications for this measure can be found on pages 251-253.

EXERCISE AND PEOPLE

The statements below are about what exercise might do. Circle the word that shows if you agree with each statement.

YES = I agree
MAYBE = I am not sure if I agree
NO = I do not agree

YES MAYBE NO 1. Exercise helps people feel less anxious.

YES MAYBE NO 2. Exercise doesn't help people be less clumsy.

YES MAYBE NO 3. People who exercise usually get sick less often than people who don't exercise.

YES MAYBE NO 4. People can be just as strong, whether or not they exercise.

YES MAYBE NO 5. Exercise does not help people make friends.

YES MAYBE NO 6. People who exercise are more likely to feel good about themselves than people who don't exercise.

YES MAYBE NO 7. People who exercise are usually stronger than people who don't.

YES MAYBE NO 8. People who exercise usually like the way their bodies look.

YES MAYBE NO 9. People who exercise have more friends than those who don't.

YES MAYBE NO 10. People who exercise are just as likely to be nervous as those who don't.

YES MAYBE NO 11. Exercise does not help people like the way their bodies look.

YES MAYBE NO 12. People who exercise are usually less awkward than people who don't exercise.

YES MAYBE NO 13. Exercise doesn't help a person stay healthy.

YES MAYBE NO 14. Exercise does not affect how people feel about themselves.

INSTRUCTIONS FOR SCORING

EXERCISE AND PEOPLE

Point values are assigned to responses according to the following scoring key.

SCORING KEY

	YES	MAYBE	NO
1.	2	1	0
2.	0	1	2
3.	2	1	0
4.	0	1	2
5.	0	1	2
6.	2	1	0
7.	2	1	0
8.	2	1	0
9.	2	1	0
10.	0	1	2
11.	0	1	2
12.	2	1	0
13.	0	1	2
14.	0	1	2

This inventory can be scored by adding the point value of every response and dividing this sum by the number of responses. The maximum score attainable of 2 points indicates a strong belief in the positive effects of exercise on body image, coordination, strength, social acceptability, self-concept, ability to manage stress, and health.

In addition to an overall score for this outcome, responses can be considered separately as follows:

Area	Items
Body image	8, 11
Coordination	2, 12
Strength	4, 7
Social acceptability	5, 9
Self-concept	6, 14
Stress management	1, 10
Health	3, 13

EXERCISING REGULARLY

TYPE OF MEASURE: Affective

OUTCOME ASSESSED: Perceived Ability to Exercise Regularly

TARGET POPULATION: Adults or Adolescents

GENERAL DESCRIPTION:

This measure is designed to assess individuals' perceived self-efficacy in being able to exercise regularly. Individuals are presented with a series of situations which might promote or serve as barriers to regular exercise and asked to indicate if they can exercise regularly in each situation. If they indicate that they can exercise regularly, then they are asked to estimate, on a 10 to 100 numerical scale, how confident they are of their ability to exercise regularly in that situation.

ADDITIONAL INFORMATION:

Test specifications for this measure can be found on pages 254-256.

EXERCISING REGULARLY

This survey is about exercising regularly in various situations. Regular exercise requires 20 minutes or more of strenuous activity at least three times per week.

Read each statement. Circle YES or NO to show if you could exercise regularly in that situation. If you circle YES, then use the Confidence Scale to show how certain you are of your answer.

The following examples show how the Confidence Scale is used.

Physical Strength Examples	CAN YOU DO THIS?	IF YES, HOW CERTAIN ARE YOU?
You can lift a 50 pound weight.	(YES)/NO	70
You can lift a 200 pound weight.	YES/(NO)	____

Confidence Scale

10 Very Uncertain — 20 — 30 — 40 — 50 Somewhat Certain — 60 — 70 — 80 — 90 — 100 Very Certain

		CAN YOU EXERCISE REGULARLY?	IF YES, HOW CERTAIN ARE YOU?
1.	You are on a vacation.	YES/NO	____
2.	There are no convenient places to exercise.	YES/NO	____
3.	You notice you are putting on a few extra pounds.	YES/NO	____
4.	You are unusually busy.	YES/NO	____
5.	You would like to try a new sport.	YES/NO	____
6.	You find yourself with extra time on your hands.	YES/NO	____

		CAN YOU EXERCISE REGULARLY?	IF YES, HOW CERTAIN ARE YOU?
7.	You have just moved to a new neighborhood.	YES/NO	_____
8.	You feel as though you'll never be good at sports.	YES/NO	_____
9.	You are trying to save money.	YES/NO	_____
10.	Friends or relatives from out of town are visiting for several weeks.	YES/NO	_____
11.	You can't find others who want to exercise with you.	YES/NO	_____
12.	You've taken on some major additional responsibilities and don't have much free time.	YES/NO	_____
13.	You don't have the necessary equipment for a sport you'd like to try.	YES/NO	_____
14.	A few of your friends are starting a regular exercise program and want you to participate with them.	YES/NO	_____
15.	You are facing major financial difficulties.	YES/NO	_____
16.	You are tired and low on energy.	YES/NO	_____
17.	The weather has been bad and is expected to stay that way for a while.	YES/NO	_____
18.	You feel overworked.	YES/NO	_____
19.	You have just recovered from an injury you got while exercising.	YES/NO	_____
20.	You have been feeling depressed for quite awhile.	YES/NO	_____

INSTRUCTIONS FOR SCORING

EXERCISING REGULARLY

This inventory can be scored in several ways, two of which are described below. The first procedure relies on the YES/NO responses only, providing an easily obtained gross index of perceived ability to exercise regularly. The second procedure combines the YES/NO responses and the confidence ratings in a single score, providing an index that reflects perceived ability to exercise regularly across a variety of settings, coupled with the level of confidence manifested in that ability.

ANALYSIS OF YES/NO RESPONSES ONLY

Count the number of YES responses, disregarding the confidence ratings. The maximum score attainable of 20 YES responses represents a strong perceived ability to exercise regularly in a wide variety of settings.

ANALYSIS COMBINING YES/NO RESPONSES AND CONFIDENCE RATINGS

Total all of the confidence ratings made in conjunction with a "YES" response and divide this sum by 20 (the total number of items in the inventory.) Confidence ratings made in conjunction with a "NO" response should be omitted from the analysis. The maximum score attainable of 100 represents a strong perceived ability to exercise regularly across a wide variety of settings, along with a high level of confidence in that ability. It should be noted that this scoring procedure assumes a confidence rating of zero for those items to which respondents indicated "NO," meaning that they do not think they are able to exercise regularly in the situation described.

EXERCISE SURVEY

TYPE OF MEASURE: Affective

OUTCOME ASSESSED: Intention to Exercise Regularly

TARGET POPULATION: Adults or Adolescents

GENERAL DESCRIPTION:

This measure is designed to assess the extent to which individuals intend to exercise regularly. Individuals are asked whether they intend to exercise regularly during specified future time periods. If individuals indicate that they intend to exercise regularly for a particular time period, then they are asked to estimate, on a 10 to 100 numerical scale, the strength of their intention.

ADDITIONAL INFORMATION:

Test specifications for this measure can be found on pages 257-259.

EXERCISE SURVEY

This survey asks about your intention to exercise regularly. Regular exercise requires 20 minutes or more of strenuous activity at least three times per week.

Read each question and circle YES or NO. If you circle YES, then use the Confidence Scale to show how certain you are that you intend to exercise regularly.

The following examples show how the Confidence Scale is used.

Physical Strength Examples	**CIRCLE YES OR NO**	**IF YES, HOW CERTAIN ARE YOU?**
Can you lift a 50 pound weight?	**(YES) NO**	**70**
Can you lift a 200 pound weight?	**YES (NO)**	**____**

Confidence Scale

10	20	30	40	50	60	70	80	90	100
Very Uncertain				**Somewhat Certain**					**Very Certain**

		CIRCLE YES OR NO	IF YES, HOW CERTAIN ARE YOU?
1.	Do you intend to exercise regularly for the next week?	YES/NO	_____
2.	Do you intend to exercise regularly for the next month?	YES/NO	_____
3.	Do you intend to exercise regularly for the next year?	YES/NO	_____
4.	Do you intend to exercise regularly for the rest of your life?	YES/NO	_____

INSTRUCTIONS FOR SCORING

EXERCISE SURVEY

This inventory can be scored in several ways, two of which are described below. The first procedure relies on the YES/NO responses only, providing an easily obtained gross index of intention to exercise regularly. The second procedure combines the YES/NO responses and the confidence ratings in a single score, providing an index that reflects intention to exercise regularly for varied time periods, coupled with the level of confidence manifested in that intention.

ANALYSIS OF YES/NO RESPONSES ONLY

Count the number of YES responses, disregarding the confidence ratings. The maximum score attainable of 4 YES responses represents a strong intention to exercise regularly for an extended period of time.

ANALYSIS COMBINING YES/NO RESPONSES AND CONFIDENCE RATINGS

Total all of the confidence ratings made in conjunction with a "YES" response and divide this sum by 4 (the total number of items in the inventory.) Confidence ratings made in conjunction with a "NO" response should be omitted from the analysis. The maximum score attainable of 100 represents a strong intention to exercise regularly for an extended period of time, along with a high level of confidence in that ability. It should be noted that this scoring procedure assumes a confidence rating of zero for those items to which respondents indicated "NO," meaning that they do not think they are able to exercise regularly for the time period specified.

MY BODY

TYPE OF MEASURE: Affective

OUTCOME ASSESSED: Respect for One's Body

TARGET POPULATION: Elementary school children

GENERAL DESCRIPTION:

This measure is designed to assess children's respect for their bodies. Children are asked to indicate whether they would engage in activities which are healthful and avoid activities which are harmful to the body.

ADDITIONAL INFORMATION:

Test specifications for this measure can be found on pages 260-261.

MY BODY

Read each question. Then put a check (√) under the answer that best tells what you are willing to do to take care of your body.

In order to take care of your body, are you willing to ...	CERTAINLY YES	PROBABLY YES	MAYBE	PROBABLY NOT	CERTAINLY NOT
1. ... exercise several times each week?	___	___	___	___	___
2. ... never drink large amounts of alcohol?	___	___	___	___	___
3. ... do what your doctor tells you to do?	___	___	___	___	___
4. ... never smoke any cigarettes?	___	___	___	___	___
5. ... get immunizations against diseases?	___	___	___	___	___
6. ... get at least 8 hours of sleep every night?	___	___	___	___	___
7. ... see your doctor regularly?	___	___	___	___	___
8. ... not let yourself get too anxious?	___	___	___	___	___
9. ... be careful about what you eat?	___	___	___	___	___
10. ... never take drugs that are not necessary?	___	___	___	___	___

INSTRUCTIONS FOR SCORING

MY BODY

Point values are assigned to responses according to the following scoring key:

SCORING KEY

CERTAINLY YES	=	5
PROBABLY YES	=	4
MAYBE	=	3
PROBABLY NOT	=	2
CERTAINLY NOT	=	1

This inventory can be scored by adding the point value of every response and dividing this sum by the number of responses. The maximum score attainable of 5 points indicates a strong respect for one's body, as evidenced by a willingness to engage in activities which are good for it and to avoid those which are not.

CHAPTER SIX

OTHER MEASURES

This chapter contains the previously developed measures that were located as a result of a comprehensive literature search and then identified as corresponding to one or more of the outcome statements listed in Chapter Four. The process by which existing measures were screened and selected is explained more completely in Chapter Two.

A descriptor page precedes each measure. This page indicates the type of measure (behavioral, knowledge, skill, or affective), the title of the outcome assessed, and the target population for the instrument. A general description is presented, providing an overview of the assessment strategy employed in the measure. The general description also provides information about the manner in which the instrument has previously been used. A technical information section summarizes any psychometric information that has been collected for the instrument. The measure's author(s) are listed. If there is any additional information available about a measure, reference citations are also given.

All of the measures in this chapter have been readied for possible photocopying. Directions to respondents and scoring instructions have been provided whenever they were available.

CANADA FITNESS SURVEY - PHYSICAL ACTIVITIES

TYPE OF MEASURE: Behavioral

OUTCOME ASSESSED: Maintenance of an Acceptable Activity Level

TARGET POPULATION: Elementary-school children to Adults

GENERAL DESCRIPTION:

Canada Fitness Survey - Physical Activities is a self-administered questionnaire designed to elicit information about individuals' physical activities. Respondents are asked to describe the frequency and intensity of their current daily and weekly activities, then to recall additional activities in which they participated during the last month and year.

Physcial Activities is one of the measures used in the Canada Fitness Survey, a program designed to collect fitness and physical activity statistics. Other measures include questions about leisure time as well as health and lifestyle. The Standardized Test of Fitness (STF) is also administered as part of this battery. (See Standardized Test of Fitness, page 131).

AUTHORS:

Fitness and Amateur Sport
Government of Canada

ADDITIONAL INFORMATION:

The entire Canada Fitness Survey is available from:
Fitness and Amateur Sport
Ottawa, Canada
K1A 0X6

1

PHYSICAL ACTIVITIES

WHAT YOU DO AT WORK OR AT SCHOOL OR IN THE HOME, PLUS YOUR ACTIVITY IN YOUR LEISURE TIME ALL CONTRIBUTE TO YOUR CURRENT LEVEL OF FITNESS. THE FOLLOWING QUESTIONS WILL PROVIDE A COMPLETE PICTURE OF ALL YOUR ACTIVITIES.

TO HELP YOU DESCRIBE YOUR ACTIVITIES, WE HAVE DESIGNED FOUR QUESTIONS – ONE FOR THOSE YOU DO DAILY, ONE FOR THOSE YOU DO EACH WEEK, ONE FOR THOSE YOU HAVE DONE IN THE LAST MONTH, AND THE FOURTH FOR THOSE ACTIVITIES YOU HAVE DONE IN THE LAST YEAR.

1. DAILY ACTIVITIES

For those activities which you do most days of the week (such as work, school and housework), how much time do you spend. . .

	Almost all of the time	About 3/4 of the time	About 1/2 of the time	About 1/4 of the time	Almost none of the time
Sitting	1	2	3	4	5
Standing	1	2	3	4	5
Walking	1	2	3	4	5
Walking up stairs	1	2	3	4	5
Lifting or carrying heavy objects	1	2	3	4	5

2. WEEKLY ACTIVITIES

Please refer to the reference card for a list of activities. Answer the following for the physical activities you do each week.

Light housework and handywork: washing dishes, ironing, making beds, mowing lawn, etc

Number of occasions each month: J F M A M J J A S O N D

Average time actually spent on each occasion: Hrs Mins

Intensity: Light (Slight change from normal breathing) | Medium (Some perspiration. Above normal breathing) | Heavy (Heavy perspiration. Heavy breathing)

Heavy housework and handywork: washing and waxing floors, painting, etc

Number of occasions each month: J F M A M J J A S O N D

Average time actually spent on each occasion: Hrs Mins

Intensity: Light (Slight change from normal breathing) | Medium (Some perspiration. Above normal breathing) | Heavy (Heavy perspiration. Heavy breathing)

Name of activity

Number of occasions each month: J F M A M J J A S O N D

Average time: Hrs Mins

Intensity: Light | Medium | Heavy

Organized in levels or in a league: Yes | No

Competitive: Yes | No

Name of activity

Number of occasions each month: J F M A M J J A S O N D

Average time: Hrs Mins

Intensity: Light | Medium | Heavy

Organized: Yes | No

Competitive: Yes | No

Name of activity

Number of occasions each month: J F M A M J J A S O N D

Average time: Hrs Mins

Intensity: Light | Medium | Heavy

Organized: Yes | No

Competitive: Yes | No

Name of activity

Number of occasions each month: J F M A M J J A S O N D

Average time: Hrs Mins

Intensity: Light | Medium | Heavy

Organized: Yes | No

Competitive: Yes | No

2

3. ACTIVITIES IN THE LAST MONTH

Please refer to the reference card for a list of activities. Answer the following for the physical activities you have done at least once in the last month. (Do not include activities already listed in Weekly Activities.)

Gardening and cultivating such as spading, digging, weeding

Occasions in the last month	Average time actually spent on each occasion Hrs	Mins	Intensity: Light (Slight change from normal state)	Medium (Some perspiration. Above normal breathing)	Heavy (Heavy perspiration. Heavy breathing)
			1	2	3

Shovelling snow

Occasions in the last month	Average time actually spent on each occasion Hrs	Mins	Intensity: Light (Slight change from normal state)	Medium (Some perspiration. Above normal breathing)	Heavy (Heavy perspiration. Heavy breathing)
			1	2	3

Mowing the lawn (pushing a power mower)

Occasions in the last month	Average time actually spent on each occasion Hrs	Mins	Intensity: Light (Slight change from normal state)	Medium (Some perspiration. Above normal breathing)	Heavy (Heavy perspiration. Heavy breathing)
			1	2	3

Name of activity _____

Occasions in the last month	Average time Hrs	Mins	Intensity: Light	Medium	Heavy	Organized in levels or in a league: Yes	No	Competitive: Yes	No
			1	2	3	1	2	1	2

Name of activity _____

Occasions in the last month	Average time Hrs	Mins	Intensity: Light	Medium	Heavy	Organized: Yes	No	Competitive: Yes	No
			1	2	3	1	2	1	2

Name of activity _____

Occasions in the last month	Average time Hrs	Mins	Intensity: Light	Medium	Heavy	Organized: Yes	No	Competitive: Yes	No
			1	2	3	1	2	1	2

Name of activity _____

Occasions in the last month	Average time Hrs	Mins	Intensity: Light	Medium	Heavy	Organized: Yes	No	Competitive: Yes	No
			1	2	3	1	2	1	2

Name of activity _____

Occasions in the last month	Average time Hrs	Mins	Intensity: Light	Medium	Heavy	Organized: Yes	No	Competitive: Yes	No
			1	2	3	1	2	1	2

Name of activity _____

Occasions in the last month	Average time Hrs	Mins	Intensity: Light	Medium	Heavy	Organized: Yes	No	Competitive: Yes	No
			1	2	3	1	2	1	2

Name of activity _____

Occasions in the last month	Average time Hrs	Mins	Intensity: Light	Medium	Heavy	Organized: Yes	No	Competitive: Yes	No
			1	2	3	1	2	1	2

3

4. ACTIVITIES IN THE LAST YEAR

Please refer to the reference card for a list of activities. Answer the following for the physical activities you have done in the last 12 months.
(Do not include activities you have already listed.)

	Months in which activity was done												Number of occasions in last 12 months	Average number of minutes spent on each occasion			
	J	F	M	A	M	J	J	A	S	O	N	D		less than 15	15 to 30	31 to 60	61 or more
Walking for exercise																	
Jogging (using short strides)																	
Running (using long strides)																	
Bicycling																	
Home exercise (push-ups, sit-ups)																	
Exercise classes																	
Weight training																	
Yoga																	
Golf (walking and carrying clubs)																	
Racquetball																	
Squash																	
Tennis																	
Baseball																	
Softball																	
Ice hockey																	
Curling																	
Swimming at a pool																	
Cross country skiing																	
Alpine/Downhill skiing																	
Ice skating																	
Names of activities:																	

4

PHYSICAL ACTIVITY IN YOUR LEISURE TIME

5. Here is a list of reasons why some people do physical activities during their leisure time. How important is each of these to you?

	Very important	Of some importance	Of little importance	Of no importance
To feel better mentally and physically	1	2	3	4
To be with other people	1	2	3	4
For pleasure, fun or excitement	1	2	3	4
To control weight or to look better	1	2	3	4
To move better or to improve flexibility	1	2	3	4
As a challenge to my abilities	1	2	3	4
To relax or reduce stress	1	2	3	4
To learn new things	1	2	3	4
Because of fitness specialist's advice for improving health in general	1	2	3	4
Because of doctor's orders for therapy or rehabilitation	1	2	3	4
Other	1	2	3	4

6. With whom do you *usually* do your physical activities in your leisure time?

- ☐ No one
- ☐ Friends
- ☐ Immediate family or relatives
- ☐ Co-workers
- ☐ Classmates at school
- ☐ Others

7. When do you *usually* do your physical activities? (Indicate one only.)

- ☐ Weekdays
- ☐ Weekends
- ☐ Both

8. At what time do you *usually* do your physical activities? (Indicate more than one if you usually do activities *more than once a day*.)

- ☐ In the morning
- ☐ At lunchtime
- ☐ In the afternoon
- ☐ In the evening
- ☐ At no special time

9. Where do you *usually* do your physical activities? (Indicate one or more.)

- ☐ Home
- ☐ Work
- ☐ School, college or university facility
- ☐ Park
- ☐ Recreational facility
- ☐ Other
- ☐ Commercial facility or private club
- ☐ Outside using no special facility

10. How long have you been doing some physical activity in your leisure time at least once a week?

- ☐ I don't do an activity each week
- ☐ For less than 3 months
- ☐ From 3 months to just under 6 months
- ☐ From 6 months to just under 1 year
- ☐ From 1 year to just under 3 years
- ☐ From 3 years to just under 5 years
- ☐ Five or more years

11. Comparing yourself to others of your own age and sex, would you say you are. . . .

- ☐ More fit
- ☐ Less fit
- ☐ As fit

QUESTIONNAIRE ON EXERCISE

TYPE OF MEASURE: Behavioral

OUTCOME ASSESSED: Maintenance of an Acceptable Activity Level

TARGET POPULATION: Adults or Adolescents

GENERAL DESCRIPTION:

The Questionnaire on Exercise is designed to elicit information about individuals' planned physical activities. Respondents are presented with a variety of physical activities, e.g., archery, football, isometrics, then asked for the quantity, duration, and frequency of each activity. Respondents are also asked if they enjoy participating in each activity. The inventory concludes with six general health and well-being questions.

AUTHORS:

Richard Carter, M.D.
Private Practice, Seattle, Washington

ADDITIONAL INFORMATION:

Carter, R. Exercise and happiness. Journal of Sports Medicine, 1977, 17, 307-313.

QUESTIONNAIRE ON EXERCISE

QUESTIONNAIRE ON EXERCISE (slightly modified)

All information will be kept confidential.

Age . Sex . . . Height . . Weight . . . . Marital status . .

Activity	Quantity or distance (mi., yds., sets, etc.)	Time to complete activity (minutes)	Frequency per month	Do you enjoy participating in this activity?	Activity	Quantity or distance (mi., yds., sets, etc.)	Time to complete activity (minutes)	Frequency per month	Do you enjoy participating in this activity?
Archery					Ping-pong				
Badminton					Rope skipping				
Basketball					Rowing				
Billards/Pool					Running in place				
Bowling					Running-jogging				
Boxing					Shuffleboard				
Calisthenics					Skating				
Cycling-bike					Skiing				
Dancing, specify step:					Soccer/Lacrosse				
					Squash				
Fencing					Stair climbing				
Football					Swimming				
Golf					Tennis (singles)				
Gymnastics					Volleyball				
Hockey					Walking				
Horseshoes					Weight lifting				
Isometrics					Wrestling				
Isotonics					Other, specify				
Judo, king-fu, karate									

About how many total hours do you spend, in an average week, exercising? . . . . . .

How would you describe your health?

poor . . . . . fair . . . . . good . . . . . excellent . . . . . .

Do you consider yourself:

underweight . . . . about right . . . . . overweight

Taken all together, how would you say you are these days?

very happy pretty happy not too happy

Please mark the line which best describes the way you feel right now.

Happy Unhappy

6 5 4 3 2 1

UNIVERSITY OF PENNSYLVANIA ALUMNI HEALTH QUESTIONNAIRE

TYPE OF MEASURE: Behavioral

OUTCOME ASSESSED: Maintenance of an Acceptable Activity Level

TARGET POPULATION: Adults

GENERAL DESCRIPTION:

The Alumni Health Questionnaire is designed to elicit information about individuals' physical activities. Respondents are asked to list the kinds of sports, recreation, or other physical activities they have participated in and how long they remained physically active with each. The questionnaire also elicits information about social and dietary habits as well as general health status. The questionnaire has been used in an ongoing study with the University of Pennsylvania alumni to determine how life styles influence health.

AUTHORS: Dr. Ralph Paffenbarger
Stanford University, Palo Alto, California

Dr. Alan Wing
Harvard University, Boston, Massachusetts

UNIVERSITY OF PENNSYLVANIA ALUMNI HEALTH QUESTIONNAIRE

Name	College & Year	Date of Birth	
Address	Degree	Height	Weight

PHYSICAL ACTIVITIES

1. How many flights of stairs do you climb up each day? _____ *flights per day (let one flight = 10 steps)*

2. How many city blocks or their equivalent do you walk each day? _____ *blocks per day (Let 12 blocks = 1 mile)*

3. List any sports or recreation you have participated in during the past week. Please include only the time you were physically active (*i.e., actual playing time, jogging time, bicycling time, swimming time, brisk walking, gardening, carpentry, calisthenics, etc.)*

Sport, Recreation, or Other Physical Activity	Number of Times per Week	Average Time per Episode		Number of Weeks per Year
		Hours	Minutes	

4. List any sports or recreation you have actively participated in during the past year. Please remember seasonal sports or events.

Sport, Recreation, or Other Physical Activity	Number of Weeks per Year	Time per Week when Active		Years of Participation
		Hours	Minutes	

5. On a usual weekday and a weekend day during the past week how much time did you spend on the following activities? *Total for each day should add to about 24 hours.*

	Weekday Hours per Day	Weekend Day Hours per Day
A. Vigorous activity *(digging in the garden, strenuous sports, jogging, chopping wood, heavy carpentry, bicycling on hills, etc.)*		
B. Moderate activity *(housework, light sports, walking, yard work, lawn mowing, painting, repairing, light carpentry, bicycling on level ground, etc.)*		
C. Light activity *(sitting, office work, driving a car, eating, personal care, etc.)*		
D. Sleeping		
	Total = 24 hr	Total = 24 hr

6. Would you say that during the past week you were less active than usual, more active, or about as active as usual?
☐ less active than usual ☐ more active than usual ☐ about as active as usual

7. At least once a week, do you engage in any regular activity akin to brisk walking, jogging, bicycling, etc. long enough to w up a sweat?
☐ No
☐ Yes —— How many times per week? _____ Activity _____

8. Are there any other physical activities that you engage in?

SOCIAL AND DIETARY HABITS

9. Do you smoke CIGARETTES now? ☐ No ☐ Yes How many CIGARETTES per day? _____
Do you drink COFFEE now? ☐ No ☐ Yes How many CUPS per day? _____
Do you drink TEA now? ☐ No ☐ Yes How many CUPS per day? _____
Do you drink MILK now? ☐ No ☐ Yes How many GLASSES per day? _____ *(1 glass=8*

10. Do you drink alcoholic beverages?
☐ No
☐ Yes
Number Per Week
a. Wine, sherry, port _____ Glasses per week *(1 glass = 4 oz.)*
b. Spirits or hard liquor _____ Drinks per week *(1 drink = 1¼ oz.)*
c. Beer, ale, etc. _____ Bottles per week *(1 bottle = 12 oz.)*

11. How many times a week do you eat each of the following foods?
Fish ____; Meat ____; Poultry ____; Eggs ____; Cheese ____; Butter or margarine ____;
Breads & cereals ____; Potatoes ____; Rice ____; Vegetables ____; Green salads ____;
Fruits and fruit juices ____; Sweet desserts ____; Candy ____

12. When eating meat, do you avoid eating the fat? Yes ☐ No ☐

13. Do you often add salt to your food? Yes ☐ No ☐; Pepper? Yes ☐ No ☐;
Catsup, mustard, or spices? Yes ☐ No ☐; Mayonnaise or salad oil? Yes ☐ No ☐

14. How often do you use the following types of medicine?
Aspirin, Bufferin ..... Never ☐ Occasionally ☐ Frequently ☐
Vitamin pills ..... Never ☐ Occasionally ☐ Frequently ☐
Sleeping pills ..... Never ☐ Occasionally ☐ Frequently ☐
Tranquilizers ..... Never ☐ Occasionally ☐ Frequently ☐
Laxatives ..... Never ☐ Occasionally ☐ Frequently ☐
Anti-acid medicine ..... Never ☐ Occasionally ☐ Frequently ☐

15. Do you have a medical check-up regularly every year? Yes ☐ No ☐

16. How often do you experience:

	Never	Occasionally	Frequently
Sensation of heart beating (except after exercise)	☐	☐	☐
Insomnia	☐	☐	☐
Sense of exhaustion (except after exercise)	☐	☐	☐
Periods of alternating gloom and cheerfulness	☐	☐	☐
Periods of being particularly self-conscious	☐	☐	☐

PHYSICAL ACTIVITY MONITOR

TYPE OF MEASURE: Behavioral

OUTCOME ASSESSED: Maintenance of an Acceptable Activity Level

TARGET POPULATION: Adults or Adolescents

GENERAL DESCRIPTION:

The Physical Activities Monitor is designed to assess physical activity levels. Respondents are asked to keep track of daily physical activity for one week. All activities should be included, but activities to specifically improve physical fitness are underlined. The date, activity, time of day, duration in minutes, intensity, and rating regarding how the activity felt are recorded on the chart.

This measure is part of a fitness education program entitled Fitness for Everybody.

AUTHOR: Sharon Dorfman
University of Massachusetts Health Services
Health Education Division
Amherst, Massachusetts

PHYSICAL ACTIVITY MONITOR

Fitness For EveryBody
Physical Activity Monitor

Please keep track of your daily physical activity for one week. Include all activity, but underline any activity you are consciously doing to improve your fitness level and that is a change from your normal routine. Exercise counts, of course, but so does bicycling to work, an afternoon in the garden, walking the dog, etc. Record:

1. The date
2. The activity: swimming, frisbee, housework, dancing, etc.
3. Time of day
4. Duration: how many minutes?
5. Intensity: rate 1, 2 or 3 (3 = very strenuous; 2 = moderately strenuous; 1 = not very strenuous)
6. Rating: how did it feel? (5 = terrific; 4 = good; 3 = okay; 2 = not very good; 1 = dreadful)

Dont' forget to bring your completed form to the workshop!

DATE	ACTIVITY	TIME OF DAY	DURATION # of min.	INTENSITY 1, 2 or 3	RATING 1, 2, 3, 4 or 5

MEASURING THE BODY'S ENERGY NEEDS

TYPE OF MEASURE: Behavioral

OUTCOME ASSESSED: Maintenance of an Acceptable Activity Level

TARGET POPULATION: Adults or Adolescents

GENERAL DESCRIPTION:

This measure is designed to provide a detailed method for determining daily energy needs. Respondents are asked to recall their physical activities for a 24-hour period, then note how many minutes were spent at each of eight energy levels. The energy cost in kilocalories for each activity is calculated and totalled to obtain the daily energy expenditure. Charts and graphs are provided to aid in the step-by-step calculations. The physical activities logs are used to classify the respondents' lifestyles based on activity levels. Classifications range from sedentary to vigorous.

AUTHORS:

Eva May Hamilton and Eleanor Whitney
Florida State University

ADDITIONAL INFORMATION:

This measure is copyrighted. The measure and directions for use can be found in:

Hamilton, E. M. & Whitney, E. Nutrition: Concepts and Controversies. St. Paul, Minnesota: West Pub. Co., 1979, 161-171.

AAHPER COOPERATIVE PHYSICAL EDUCATION TESTS

TYPE OF MEASURE: Knowledge

OUTCOME ASSESSED: Effects of Exercise

TARGET POPULATION: Elementary-school children or adolescents

GENERAL DESCRIPTION:

The AAPHER Cooperative Physical Education Tests are designed to measure knowledge of the effects of physical activity. The tests are comprised of multiple-choice items relevant to the physical and psycho-social effects of activity or knowledge of basic body mechanics. Other items concern the protective requirements for minimizing exercise-related health risks and the factors modifying participation in activities, e.g., nutrition, stress, substance abuse, etc. The tests are available in six forms. Forms 4A and 4B are appropriate for grades 4, 5, and 6. Forms 3A and 3B are appropriate for grades 7, 8, and 9. Forms 2A and 2B are appropriate for grades 10, 11, and 12. A handbook for scoring and interpreting test performances is also provided.

TECHNICAL INFORMATION:

The internal consistency (KR20) of the six forms of the test was calculated on the basis of tests administered to the norming sample at grades 4-12. The number of subjects involved in the analyses for a given form at a particular grade level ranged from 410 to 1,0005 students. The KR20 coefficients ranged from .72 to .82.

Alternate forms' reliability coefficients (Form A vs. Form B) were calculated for grades 4-12 with well over one thousand students per grade. These coefficients ranged from .69 to .76.

In addition to content validation procedures based on the use of authority-recognized materials for test content, the test developers also computed correlations between test scores and end-of-course grades for samples of 54 to 191 students in grades 4-12. These coefficients ranged from -.02 to .65. Of the 36 correlation coefficients computed, 16 were statistically significant beyond the .01 level.

AUTHORS:

American Association for Health, Physical Education, and Recreation

Educational Testing Service
Princeton, New Jersey

ADDITIONAL INFORMATION

These tests are copyrighted. The test forms and handbook are available from Educational Testing Service, Princeton, New Jersey.

STANDARDIZED TEST OF FITNESS

TYPE OF MEASURE: Skill

OUTCOME ASSESSED: Fitness Self-Assessment

TARGET POPULATION: Adults or Adolescents

GENERAL DESCRIPTION:

The Standardized Test of Fitness (STF) is designed to establish a field test of fitness and to standardize cardiovascular performance tests as a motivation for individuals to pursue physical fitness. The test is comprised of a battery of tests and measurements of anthropometry, strength, muscular endurance, flexibility, and cardiorespiratory endurance. Assessment evaluations, norms, and percentile scores are provided. The developers recommend that the Physical Activity Readiness Questionnaire (PAR-Q) be administered prior to the actual fitness assessment and that physical activity counseling follow the fitness test. The booklets, Assessment Report and Aerobic Calculator, are available to provide individuals with immediate knowledge of their test results, basic information on fitness, and instructions on how to use these test results to initiate a walk/jog exercise prescription.

The STF is one of the measures used in the Canada Fitness Survey, a program designed to collect fitness and physical activity statistics. (See also Canada Fitness Survey - Physical Activities, page 117.)

AUTHOR: Fitness and Amateur Sport
Government of Canada

ADDITIONAL INFORMATION:

Copies of Assessment Report may be obtained in packages of 25 at $7.50 per package from:

Canadian Government Publishing Centre
Supply and Services Canada
Hull, Quebec K1A0S9

Prepayment is required. Check or money orders should be made payable to the Receiver General of Canada.

STANDARDIZED TEST OF FITNESS

Preliminary Considerations

Qualifications of the Examiners

It is recommended that the examiners of the Standardized Test of Fitness be familiar with laboratory fitness testing procedures and have a working knowledge of exercise physiology, fitness and exercise prescription. Instruction and certification in cardio-pulmonary resuscitation (CPR) from a recognized authority prior to commencing testing is strongly advised.

Testing Locale

A room measuring at least 12' x 20', removed from noise and excessive heat (>22° C), and in which the temperature can be controlled, is required for the testing locale. The locale should be arranged to permit the subjects to change into their testing attire or it should be located close to changing quarters.

Equipment Kit and Supplies

The equipment kit required to implement the test and measurements is as follows:

Description	Cost*
Harpenden fat caliper	$ 115.00
K & E anthropometric tape	20.00
Wall tape	5.00
Seca spring-scale	65.00
Stoelting hand dynanometer	140.00
Modified Wells and Dillon flexometer	50.00
Ergometer steps	50.00
Propper stethoscope	25.00
Propper sphygmomanometer	75.00
Timer	25.00
Recorder-cassette or record player	50.00
Set of C.H.F.T. tapes or record	5.00
Room thermometer	5.00
Aerobic Calculator	—

*Prices as of January 1979

Some equipment may be purchased from local distributors or medical supply dealers. Additional information may be obtained from Departments of Physical Education at various colleges and universities, or by writing to Fitness Canada. The flexometer and ergometer steps may be constructed by following the plans enclosed within the Appendices.

Calibration of Equipment

Calibration of equipment before and during the test period is essential to assure valid results.

Whether you are employing the tape or record version of the Canadian Home Fitness Test, it is imperative that the cadence recorded be verified using a timer. For correct stepping cadences refer to the following table:

Stepping cadence (per min.)		
Stage	Males	Females
1	66	66
2	84	84
3	102	102
4	114	114
5	132	120
6	144	132
7	156	

The Seca spring-scale should be calibrated with the use of known weights. To calibrate the Stoelting hand dynamometer contact your local university equipped with a research lab for assistance.

Emergency Procedures

If the tests are properly administered the chances of an untoward event during the testing is unlikely. Notwithstanding, the examiner should develop an emergency protocol which should be posted in a suitable location.

Instructions for the Subjects

In order to achieve standardization, the following information should be given to the subject in writing at least 48 hours prior to the testing session.

Dress

It is recommended that subjects be attired in the following dress:

males
- loose fitting shorts
- shirt or T-shirt

females
- loose fitting shorts
- preferably the top part of a two-piece swim suit or a loose blouse

Pre-test information (related to step-test)

The subject should not exercise prior to the testing session.

The subject should not consume alcohol for six hours prior to the test, nor eat, smoke or drink tea or coffee for at least two hours. Preferably, the test should be taken in the morning with the subject having eaten a light breakfast at least two hours before the test.

Consent for the Standardized Test of Fitness

I, _____ .

authorize the said Examiner _____

of _____ .

to administer and conduct an exercise fitness test designed to determine my physical work capacity. I understand that I will perform tests of grip strength, push-ups, trunk flexion and sit-ups.

I understand that I will step on double 20.3 cm steps at speeds identified for my age group. During the performance of the test my heart rate will be monitored and my blood pressure will be measured prior to and at the completion of the test.

I will first be given a three minute warm-up exercise at a rate equivalent to 65 to 70% of the average aerobic power anticipated in a person in a 10 year older age group than mine. If a predetermined heart rate is not exceeded, I will then exercise for a further three minutes at 65 to 70% of the average aerobic power for a sedentary person of my own age. If again my predetermined heart rate is not exceeded I will exercise for a further three minutes at 65 to 70% of the average aerobic power for an individual ten years younger than I am. The test will be discontinued when I reach a predetermined heart rate or if I become distressed in any way or develop any abnormal response whichever of the above occurs first. Every effort will be made to conduct the test in such a way as to minimize discomfort and risk. However, I understand that just as with other types of fitness tests there are potential risks. These include episodes of transient lightheadedness, fainting, chest discomfort, leg cramps and nausea.

In agreeing to such an examination, I waive any legal recourse against the examiner or the Department of Labour, from any and all claims resulting from personal injuries sustained or death resulting from these tests. This waiver shall be binding upon my heirs and my personal representatives.

Date _____

Subject _____
(Signature)

Witness _____

Testing Procedures

Tests and Measurements

The tests and measurements of the Standardized Test of Fitness consist of the following:

- *Pre-Test Forms and Questionnaires*
  - Consent Form
  - Lifestyle Information (optional)
  - Physical Activity Readiness Questionnaire
  - Anthropometric & Performance Data Record
- *Anthropometry*
  - Standing height
  - Weight
  - Girths (optional): chest, abdomen, gluteal, thigh
  - Skinfolds: triceps, biceps, subscapular, supra-iliac
- *Strength and muscular endurance*
  - Grip strength: right and left hand
  - 60 second sit-ups (optional)
  - Push-ups (optional)
- *Trunk forward flexion*
- *Cardio-respiratory fitness*
  - Canadian Home Fitness Test (advanced version)

Each section has been designed to measure a specific component of fitness.

The amount of space used to describe each test component is not an indication of the importance of that component within the protocol.

Sequence of Testing

Questionnaires and tests must be administered in the following sequen and strictly adhered to:

Completion of the testing consent fo

Completion of the Lifestyle Informati (optional) and Physical Activity Read ness Questionnaire (PAR-Q);

Recording of the anthropometric measurements in the order in which they are listed on the recording form;

Administration of grip strength;

Administration of the Canadian Hom Fitness Test; and

Administration of the remaining tests the following order: push-ups, trunk flexion, sit-ups.

The above sequence has been chose to minimize any error with the skin-fo measurements which might be cause by body perspiration.

Completing Forms and Questionnaires

All subjects are strongly advised to read, understand and must sign a consent form (See page 22) and PAR-Q (See page 23). PAR-Q has been designed to identify the small number of adults for whom physical activity might be inappropriate or those who should have medical advice concerning the type of activity most suitable for them. A subject should not perform any of the tests if he/she refuses to sign these forms.

To aid the examiner in post-test counselling on lifestyle and fitness, a lifestyle information questionnaire should be administered. Inform the subject that the data requested will be kept confidential. See page 24-26 for a sample questionnaire.

In addition to recording the anthropometric and performance data in the subject's Assessment Report booklet, the examiner may wish to record each subject's test results on a separate recording sheet and store this data for future post-test counselling or for research purposes. See page 27 for a sample recording sheet for the Standardized Test of Fitness.

Procedures for Recording the Anthropometric Measurements

Standing Height

Equipment:

Metric wall tape, set square

Procedure

Position the tape against a wall. Ensure that the wall tape is perfectly straight and even with the floor.

Measure to the nearest "0.2 cm" from the highest point on the top of the head.

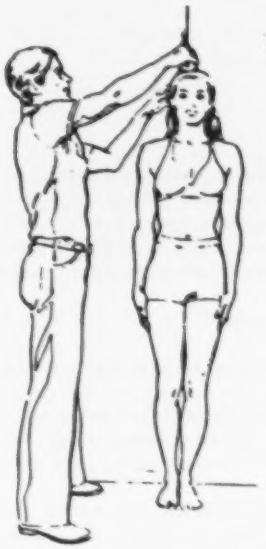
The subject must be without foot-wear, the back square against the wall tape, heels together, with the body stretched upward to the fullest extent, the shoulders relaxed and the arms stretched downward.

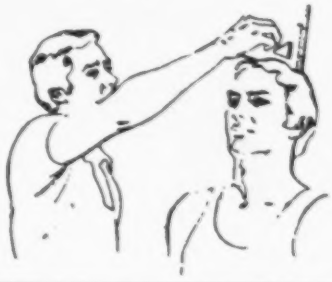
Record the height in "cm" in the space provided.

e.g. 1 8 4 . 5

Note:

To determine the measurement employ a set square resting on the top of the head and against the tape.





Weight

Equipment:

Seca scale

Procedure

Ensure the scale is on a flat surface.

If laid on a rug, use a half-inch board under the scale.

Measure to the nearest 0.5 kg.

The subject must be without footwear and in light clothing (shorts and socks for men, shorts and upper part of a two-piece swimsuit or a blouse for women).

Record the weight in "kg" in the space provided.

e.g. 0 6 8 . 5

Girth Measurements (Optional)

Equipment:

K & E anthropometric tape or equivalent.

Procedure

Ensure that the tape is properly located in accordance with the instructions and illustrations. Measure to the nearest 0.1 cm. All measurements should be taken on the right side of the subject.

Girth measurements are most useful in a test/re-test situation, for comparison.

Chest girth

With the subject standing, measure from the side of the subject to the nearest 0.1 cm.

Ensure that the tape is perfectly horizontal.

Measure on the chest at the level of the mesosternale. This is approximately on the midline of the sternum. The measurement is taken at the end of normal expiration.

Record in "cm" in the space provided.

e.g. |0|9|9 . 0|

Abdomen Girth

From a side view, with the subject standing, measure to the nearest 0.1 cm on the unclothed abdomen at the level of minimum girth.

Record in "cm" in the space provided.

e.g. |0|8|8 . 5|

Gluteal girth

With the subject standing, from a side view, measure to the nearest 0.1 cm posteriorly at the maximal protrusion of the gluteals, and anteriorly at the level of the symphysis pubis.

Record in "cm" in the space provided.

e.g. |0|7|2 . 5|

Thigh girth

With the subject standing, from a side view, measure to the nearest 0.1 cm on the unclothed right side just below the gluteal furrow (see arrow —) at the maximal girth.

Record in "cm" in the space provided.

e.g. |0|3|8 . 2|

Note:

To standardize the tape tension for all girth measurements, apply only a light tension to the tape so that indentation of the skin surface does not occur.

Skinfold Measurements

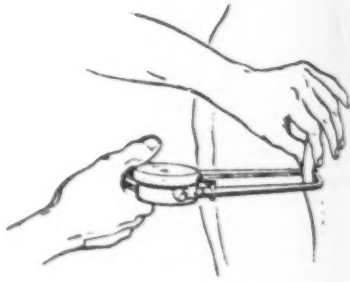
Equipment:

Harpenden caliper

Procedure

Select the prescribed site. Grasp the skinfold between the thumb and index finger 1 cm above the site and apply pressure.

The skinfold is raised and *maintained* with the thumb and forefinger with the crest of the fold following the specified alignment. Apply the caliper jaws at right angles to the prescribed site. Release the spring handles fully. Read the measurements after the full pressure of the caliper jaws has been applied, and the drift of the needle has ceased.



Record to the nearest "0.2 mm".

Repeat measurements twice. If the difference is greater than 1 mm, take a third measure and record the mean of the closest pair in the space provided.

e.g. 1 1 6 ; 4

Triceps skinfold

Measured on the back of the unclothed pendant right arm at a level midway between the tip of the acromion (see arrow→) and the tip of the elbow.

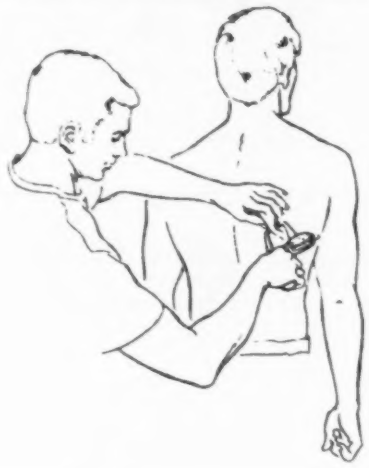
With the forearm flexed at an angle of 90°, establish the midpoint. This can be approximated with the thumbs by placing the fifth finger of the left hand on the subject's right shoulder and the fifth finger of the right hand on the tip of the subject's elbow. Lift the skinfold parallel to the long axis of the arm. Ask the subject to lower the forearm and then apply the caliper jaws to the site.

Biceps skinfold

Measured on the front of the right pendant upper arm over the biceps at a level midway between the acromion and the tip of the elbow as described for the triceps. The skinfold is lifted parallel to the long axis of the upper arm.

Subscapular skinfold

With the subject standing, measured about 1 cm below the lower angle of the right scapula. The crease of the skinfold that is lifted should run at an angle of about 45° downwards from the spine.



Supra-iliac skinfold

Measured 3 cm above the iliac crest, with the fold running parallel to the crest. The fold should be taken at the midline of the body.

Note:

Remember that the accuracy of your measurement depends on:

- precise identification of the site of the skinfold;
- forming the skinfold prior to the application of the caliper jaws;
- the standardization of the alignment of the skinfold crest; and
- complete release of the spring handles of the caliper.

Muscular Strength

Hand grip strength

Equipment:

Stoelting hand grip dynamometer

Procedure

Adjust the grip of the dynamometer to the most comfortable setting for the hand size of the subject. Lock in place. The second joint of the fingers should fit snugly under the handle and take the weight of the instrument

Have the subject take the dynamometer in the appropriate hand, holding it in line with the forearm and letting it down by the thigh. The grip is taken between the fingers and the palm at the base of the thumb. When firmly gripped, the instrument is held away from the body and squeezed vigorously, exerting maximum force. During the test neither the hand nor the dynamometer should be allowed to touch the body or any other object. Measure both hands alternatively giving two trials per hand. Add the best score for each hand and record as a single score to the nearest "kg" in the highlighted area as follows:

0	9	0

Test of Cardio-Respiratory Fitness

General

The Canadian Home Fitness Test, a double step test, was selected as the fie test to measure the cardio-respiratory fitness of the subject. In order to appre ciate the dimensions of this test you should be familiar with the following literature:

Bailey, D.A. et al. Validation of a self-administered home test of cardio-respiratory fitness. *Can. J. Appl. Sport Sci.*, 1, 67, 1976.

Shephard, R.J. et al. Development of th Canadian Home Fitness Test. *Can Med Assoc. J.*, 114, 575, 1976.

Jette, M. et al. The Canadian Home Fitness Test as a predictor of aerobic capacity. *Can. Med. Assoc. J.*, 114, 68 1976.

Jetté, M. An exercise prescription program for use in conjunction with th Canadian Home Fitness Test. *Can. J. Public Health*, 66, 461, 1975.

Equipment:

Stethoscope, sphygmomanometer, ta recorder and CHFT tapes (or record player and CHFT record), timer, steps

Procedure

Preliminaries: Have the subject remov his/her shoes, sit and rest for five minutes. Use a comfortable chair with arm rests. During this time, question th subject to ensure that all pre-testing instructions have been followed and briefly explain how the test is to be conducted and for what purposes.

Blood Pressure (Optional)

Some test administrators may find it difficult or are unable to measure blood pressure accurately. Unless administrators are capable and are familiar with the influence of exercise upon blood pressures, they would be advised to omi the measurement of blood pressure

Sphygmomanometer application: Apply the blood pressure cuff to the subject's left arm. The cuff should be wrapped firmly and smoothly around the arm with the lower margin 2 - 3 cm above the antecubital space. The arm should be comfortable, supported with the lower edge of the cuff at heart level and at an angle of 0° - 45° from the trunk. The subject will wear the cuff throughout the step test. If it tends to slip, tape it to the shoulder.

Measurement of the resting heart rate and blood pressure. Determine the resting heart rate with the stethoscope using a 15 second count five minutes after the subject has been seated and record in beats/min. in the space provided as follows:

0	8	8

Then measure the blood pressure as follows:

Position the stethoscope in your ears with the ear piece pointing forward.

Locate and note the brachial artery at the antecubital space by palpation.

Rapidly inflate the cuff to a level above the radial palpatory pressure. Quickly position the diaphragm of the stethoscope over the brachial artery. Apply minimum amount of pressure so as not to distort the artery. The diaphragm should be in complete contact with the skin. The stethoscope should not touch the cuff or its tubing.

Release the cuff pressure at a rate of approximately 2 mm per second.

The systolic pressure level is determined by the first perception of sound (first Korotkoff sound).

The diastolic fourth-phase level (D_4) is determined when the sounds cease to be tapping in quality and are fully muffled.

Deflate the cuff to zero pressure.

Record visually the *resting* systolic and diastolic fourth phase (D_4) to the nearest 2 mmHg in the appropriate space as follows:

Systolic | 1 | 2 | 0 |

Diastolic (D_4) | 0 | 8 | 0 |

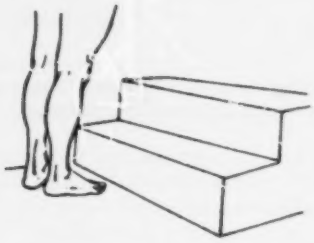
In the event the resting heart rate of a subject is above 100 b/min., and/or the resting systolic blood pressure is over 150 mmHg, and/or the fourth phase diastolic is over 100 mmHg, wait an additional five minutes and take the readings again. The subject should be excluded from the cardio-respiratory fitness test if the values are still above the criteria. Explain briefly that the heart rate and/or blood pressure readings are slightly out of the range for which the test was designed. Advise the subject to consult with his/her physician before attempting the test.

Blood pressures may be taken after the final stage of the step test. This is performed to monitor the subject's return to pre-test blood pressure values. No additional tests should be administered if values greatly exceed pre-test results.

Step testing sequence and cadence: Demonstrate and have the subject practice the stepping sequence described below.

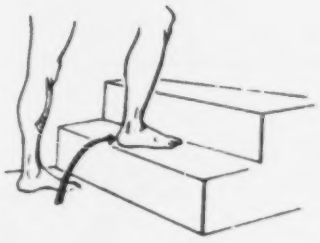
START:

Stand in front of the first step, feet together.



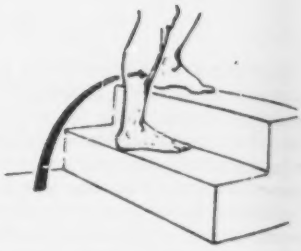
1. STEP:

Place your right foot up on the first step.



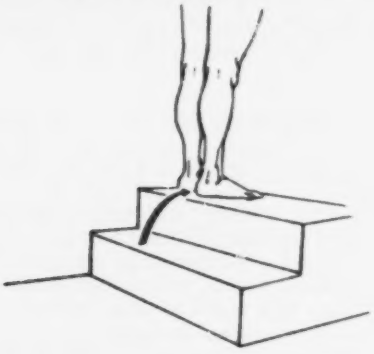
2. STEP:

Bring your left foot up to the second step.



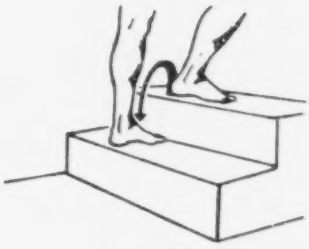
3. UP.

Bring your right foot up on the second step, feet together.



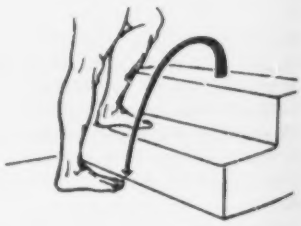
4. STEP:

Start down with your left foot to the first step.



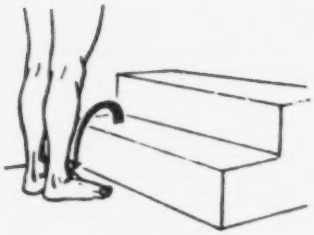
5. STEP

Bring your right foot down to the ground level.



6. DOWN:

Bring your left foot to the ground level, feet together.



STEP - STEP - UP!
STEP - STEP - DOWN!

UP - 2 - 3! DOWN - 2 - 3!

UP - 2 - 3! DOWN - 2 - 3!

Have the subject practice the starting sequence, first without the music and then with the music, but no more than twice each time. Ensure that the subject places both feet completely on the second step and that the legs are completely extended and back upright during this phase of the movement. During the test ensure that the subject maintains the proper cadence. Count and/or step a few steps with subjects who are experiencing difficulty.

Starting exercise. Determine the starting stepping exercise of the subject, based on age, using the following table:

Age	Starting Exercise	
	Males	Females
60 and over	1 (66)*	1 (66)
50-59	2 (84)	1 (66)
40-49	3 (102)	2 (84)
30-39	4 (114)	3 (102)
20-29	5 (132)	3 (102)
15-19	5 (132)	4 (114)

*(Stepping Tempo in steps per minute.)

The subject should then be informed that the first stepping exercise is three minutes in duration. The subject will cease to step when the music stops and remain motionless. Indicate that upon completion of this first stage you will inform the subject if he/she is to stop or continue for a second stage.

Post-exercise heart rate - first stage only. Start the tape recorder (or record player) and have the subject perform the first stage of the test. Observe the subject for signs of intolerance.* When the music stops have the subject remain motionless. Determine the post-exercise heart rate with the stethoscope. Start counting on the command word COUNT and continue counting until the command word STOP. (A 10-second timing sequence).

*dizziness, unusual fatigue, angina, staggering, distressful breathing, nausea, and facial expressions that indicate difficulty in maintaing the cadence.

DO NOT stop the tape (or record player) during the test. Pulse counting pauses have been recorded on the tape. It is imperative that the tape (or record player) continue operating for the duration of the test. Pulse counting and determination of the subject's ability to complete the next stage must be accomplished during the timed interval *between* the musical stepping tempos.

The determination of an accurate post-exercise heart rate is the critical measurement for deciding if the subject should continue to another stage and to predict maximum oxygen consumption ($\dot{V}O_2$ max.). Quickly determine if the subject is to continue or stop the test. The subject is not to continue if the heart rate is equal to or exceeds these Ceiling Post-Exercise Heart Rates (10 seconds count).

Ceiling Post-Exercise Heart Rates (10 sec.)

Age	after 1st stage	after 2nd stage
60 and over	24	23
50-59	25	23
40-49	26	24
30-39	28	25
20-29	29	26
15-19	30	27

Completing a second or third stage. If there are no contraindications, have the subject complete a second stage. Repeat the measurements as for the first stage. Determine if the subject is to continue for a third and final stage.

Final post-exercise heart rates. After the subject has completed a third and final stage of stepping, or when the test has been terminated on the basis of post-exercise heart rate measurement (while standing), have the subject sit down.

Blood pressure measurements (Optional). Record the systolic and diastolic (D_4) pressure readings between the thirty-second (0:30) and first minute (1:00) post-exercise period. Record the final blood pressure readings between the two-minute thirty-second (2:30) and the three-minute (3:00) post-exercice period. Record a final post-exercise heart rate between three-minutes (3:00) and three-minute thirty-seconds (3:30) post-exercise, using the stethoscope.

Discontinuation of the test. The examiner will discontinue the step test if the subject begins to stagger, complains of dizziness, extreme leg pain, nausea, chest pain, or shows facial pallor. Have the subject lie down, check his heart rate and blood pressure. Request assistance from a nurse or physician if the subject does not seem to recuperate after a few minutes. If necessary, have someone call an ambulance.

If it becomes obvious that the subject is unable to maintain the proper cadence after the first minute of stepping, step with the subject. If the difficulty in stepping appears to be related to some physiological disfunction discontinue the test. Suggest that the C.H.F.T. could be retaken later at a mutually convenient time.

Note. An overall summary of the C.H.F.T. procedure may be found in the Appendix: Physical Fitness Evaluation Chart.

Push-Ups (Optional)

If the subject does not want to perform this test, is over the age of 50, or in poor physical condition as assessed in the previous tests and measurements, omit this test and leave the recording space blank.

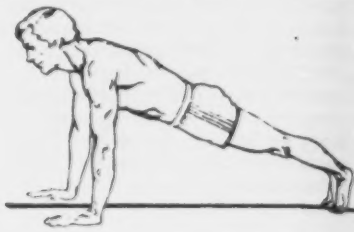
Equipment:

Mat (optional)

Procedure

Males

The subject lies on his stomach, legs together. Hands pointing forward, are positioned under the shoulders. The subject pushes up from the mat by straightening the elbows and using the toes as the pivotal point.



The upper body must be kept in a straight line. The subject returns to the starting position, *chin to the mat*.

Females

The subject lies on her stomach, legs together. Hands pointing forward, are positioned under the shoulders. The subject pushes up from the mat straightening the elbows and using the knees as the pivotal point.

The upper body must be kept in a straight line. The subject returns to the starting position, *chin to the mat*, allowing the feet to swing upwards simultaneously

Note:

The push-ups are to be performed consecutively and without a time limit. The test will be discontinued as soon as the subject is seen to strain forcibly to complete a push-up. If the subject's feet slip, assist by placing your feet behind and perpendicular to the subject's feet.

Count the initial movement and each repetition successfully completed. Record in the highlighted area as follows

[0,1,5]

Trunk Forward Flexion (Sitting)

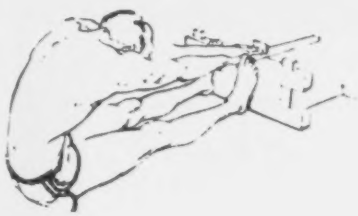
Equipment:

Modified Wells and Dillon sit and reach apparatus

Procedure

Have the subject warm-up for this test by performing slow stretching movements before taking actual measurements. The subject, barefoot, sits with the legs fully extended with the soles of the feet placed flat against the horizontal crossboard of the apparatus, with the inner edge of the sole placed 2 cm from the scale. Keeping the knees fully extended, arms evenly stretched, palms down, the subject bends and reaches forward (without jerking) pushing the sliding marker along the scale with the fingertips as far forward as possible. The position of maximum flexion must be held for approximately two seconds. The test is repeated twice. Do not allow jerking movements. If the knees flex, the trial is not counted. DO NOT ATTEMPT TO HOLD THE KNEES DOWN. Record the maximum distance reached to the nearest 0.5 cm in the highlighted area as follows:

16.5



Note:

The subject should not attempt this test if bothered by low back pain or other ailments.

Advise the subject that lowering the head will maximize the distance reached.

60-Second Sit-Ups (Optional)

If the subject does not want to perform this test, is over the age of 50, or in poor physical condition as assessed in the previous tests and measurements, omit this test and leave the recording space blank.

Equipment:

Mat (optional), timer

Procedure

The subject lies in a supine position, knees bent at a right angle and feet about 30 cm apart. The hands with fingers interlocked are placed behind the head and must be maintained in this position for the whole duration of the test.

Hold the ankles of the subject and ensure that the heels are in constant contact with the mat. When ready, give the command "Begin". The subject is required to sit up and touch the knees with the elbows and return to the starting position. The subject will perform as many repetitions as possible within one minute. The subject may pause whenever necessary.

Note:

Ensure that the subject's back returns to its initial position, that the interlocked fingers make contact with the mat or floor and that the subject exhales when sitting up. Record the number of sit-ups completed in 60 seconds in the highlighted area as follows:

30

Completing the Testing Session

Inform the subject that the testing session is over. Complete and provide the subject with the Assessment Report booklet. If this is not feasible, arrange an appointment for this purpose.

Physical Activity Readiness Questionnaire (PAR-Q)*

PARTICIPANT IDENTIFICATION

PAR Q & YOU

PAR-Q is designed to help you help yourself. Many health benefits are associated with regular exercise, and the completion of PAR-Q is a sensible first step to take if you are planning to increase the amount of physical activity in your life.

For most people physical activity should not pose any problem or hazard. PAR-Q has been designed to identify the small number of adults for whom physical activity might be inappropriate or those who should have medical advice concerning the type of activity most suitable for them.

Common sense is your best guide in answering these few questions. Please read them carefully and check (√) the ☐ YES or ☐ NO opposite the question if it applies to you.

YES	NO	
☐	☐	1. Has your doctor ever said you have heart trouble?
☐	☐	2. Do you frequently have pains in your heart and chest?
☐	☐	3. Do you often feel faint or have spells of severe dizziness?
☐	☐	4. Has a doctor ever said your blood pressure was too high?
☐	☐	5. Has your doctor ever told you that you have a bone or joint problem such as arthritis that has been aggravated by exercise, or might be made worse with exercise?
☐	☐	6. Is there a good physical reason not mentioned here why you should not follow an activity program even if you wanted to?
☐	☐	7. Are you over age 65 and not accustomed to vigorous exercise?

If You Answered

YES to one or more questions

If you have not recently done so, consult with your personal physician by telephone or in person BEFORE increasing your physical activity and/or taking a fitness test. Tell him what questions you answered YES on PAR-Q, or show him your copy.

programs

After medical evaluation, seek advice from your physician as to your suitability for:

- unrestricted physical activity, probably on a gradually increasing basis
- restricted or supervised activity to meet your specific needs, at least on an initial basis. Check in your community for special programs or services.

NO to all questions

If you answered PAR-Q accurately, you have reasonable assurance of your present suitability for:

- A GRADUATED EXERCISE PROGRAM - A gradual increase in proper exercise promotes good fitness development while minimizing or eliminating discomfort.
- AN EXERCISE TEST - Simple tests of fitness (such as the Canadian Home Fitness Test) or more complex types may be undertaken if you so desire.

postpone

If you have a temporary minor illness, such as a common cold.

Developed by the British Columbia Ministry of Health. Conceptualized and critiqued by the Multidisciplinary Advisory Board on Exercise (MABE). Translation, reproduction and use in its entirety is encouraged. Modifications by written permission only. Not to be used for commercial advertising in order to solicit business from the public.
Reference: PAR-Q Validation Report. British Columbia Ministry of Health, 1978.
Produced by the British Columbia Ministry of Health and the Department of National Health & Welfare.

Lifestyle Information Questionnaire

Confidential 1 [A]

Name

Social Insurance Number ▶ 2 10

Your Feelings ▶

1 Here is a list that describes some of the ways people feel at different times. During the past few weeks, how often have you felt...

	Often	Sometimes	Never
A On top of the world?	11 1☐	11 2☐	11 3☐
B Very lonely or remote from other people?	12 1☐	12 2☐	12 3☐
C Particularly excited or interested in something?	13 1☐	13 2☐	13 3☐
D Depressed or very unhappy?	14 1☐	14 2☐	14 3☐
E Pleased about having accomplished something?	15 1☐	15 2☐	15 3☐
F Bored?	16 1☐	16 2☐	16 3☐
G Proud because someone complimented you on something you had done?	17 1☐	17 2☐	17 3☐
H So restless you couldn't sit long in a chair?	18 1☐	18 2☐	18 3☐
I That things were going your way?	19 1☐	19 2☐	19 3☐
J Upset because someone criticized you?	20 1☐	20 2☐	20 3☐

	VERY HAPPY	PRETTY HAPPY	NOT TOO HAPPY
2 Taking things all together, how would you say things are these days – would you say you're ▶	21 1☐	21 2☐	21 3☐

Your Activities The following questions are about some of your work and leisure activities ▶

1 Which of the following best describes how you spent your leisure time during the last two weeks?

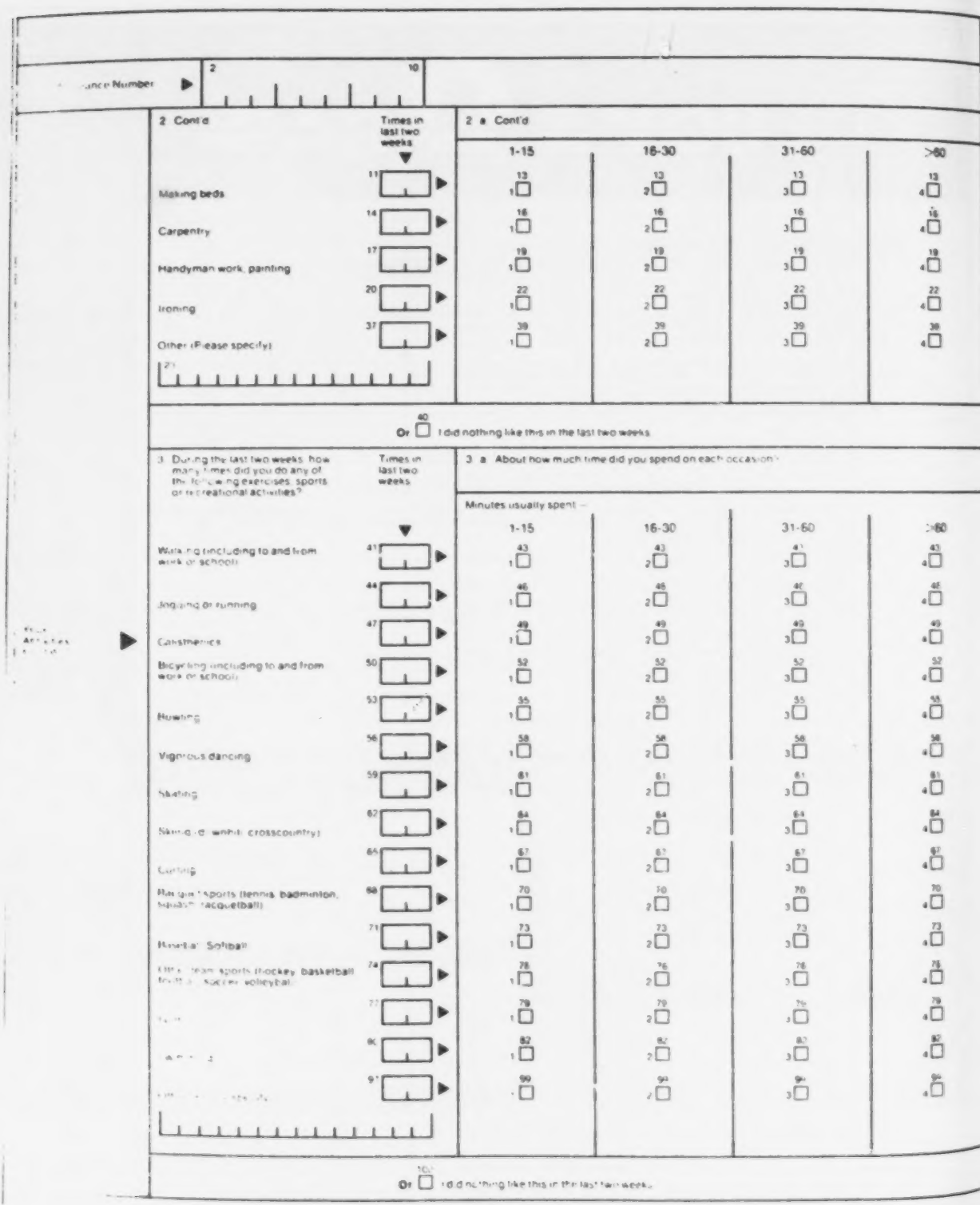
(Please check (✓) one box only)

22 1☐ Almost all of it by myself
22 2☐ A lot of it by myself
22 3☐ About half of it by myself and half of it with others
22 4☐ A lot of it with others
22 5☐ Almost all of it with others

2 During the last two weeks, how many times did you do the following tasks around your home?

2 a About how much time did you spend on each occasion?

	Times in last two weeks ▼	Minutes usually spent: 1-15	16-30	31-60	>60
Mowing the grass	23 ▶	25 1☐	25 2☐	25 3☐	25 4☐
Shoveling snow	26 ▶	28 1☐	28 2☐	28 3☐	28 4☐
Cleaning [illegible]	29 ▶	31 1☐	31 2☐	31 3☐	31 4☐
Raking leaves	32 ▶	34 1☐	34 2☐	34 3☐	34 4☐
Gardening	35 ▶	37 1☐	37 2☐	37 3☐	37 4☐


Confidential
Sequence Number
2
10
2 Cont'd
Times in last two weeks
2 a Cont'd
1-15
16-30
31-60
>60
Making beds
Carpentry
Handyman work, painting
Ironing
Other (Please specify)
Or I did nothing like this in the last two weeks
3 During the last two weeks, how many times did you do any of the following exercises, sports or recreational activities?
Times in last two weeks
3 a About how much time did you spend on each occasion?
Minutes usually spent –
1-15
16-30
31-60
>60
Walking (including to and from work or school)
Jogging or running
Calisthenics
Bicycling (including to and from work or school)
Hunting
Vigorous dancing
Skating
Skiing (cross-country)
Curling
Racquet sports (tennis, badminton, squash, racquetball)
Baseball, Softball
Other team sports (hockey, basketball, football, soccer, volleyball)
Or I did nothing like this in the last two weeks

Confidential 1 A

Name

Social Insurance Number ▶ 2 10

4 Which of the following choices best describes the work or other activity which you usually do?
(Please check (✓) one box only)

101
1 ☐ I am usually sitting during the day and do not walk about very much

101
2 ☐ I stand or walk about quite a lot during my day. But I do not have to carry or lift things very often

101
3 ☐ I usually lift or carry light loads, or I have to climb stairs or hills often

101
4 ☐ I do heavy work or carry very heavy loads

Tobacco
These questions are about your experience with tobacco and smoking ▶

1 Check any of the following which you now smoke daily

11 ☐ Pipes

12 ☐ Cigars

13 ☐ Cigarillos

14 ☐ Cigarettes **(Go to Question 3)**

15 ☐ None of these

2 What experience with cigarettes have you had?
(Please check (✓) one box only)

1
16 ☐ Never smoked

2
16 ☐ Now smoke occasionally

3
16 ☐ Used to smoke occasionally

4
16 ☐ Used to smoke daily

3 About how many cigarettes do you now smoke

a) if daily

About ☐☐ A Day (17 18)

Or

b) if occasionally

About ☐☐ A Week (19 20)

Alcohol
The following questions are about your experience with alcohol ▶

1 About how often do you usually drink alcohol?

1
21 ☐ Two or more times a day

2
21 ☐ Once a day

3
21 ☐ 4 to 6 times a week

4
21 ☐ 2 or 3 times a week

5
21 ☐ About once a week

6
21 ☐ 2 or 3 times a month

7
21 ☐ About once a month

8
21 ☐ Less often than once a month

9
21 ☐ Not at all in the last 12 months

10
21 ☐ Not at all

2 About how many drinks do you have at a time?

1
22 ☐ One

2
22 ☐ Two or three

3
22 ☐ Four or five

4
22 ☐ Six or Seven

5
22 ☐ More than that

6
22 ☐ Do not drink

The following table might help you in answering some of the above questions

One drink equals
– One pint bottle of beer (12 ounces) –
– One small glass of wine (4-5 ounces) –
– One shot of liquor or spirits (1-1 ounces) with or without mix –
A shot with a beer chaser or a double should be counted as two drinks

Confidential 1 [B]

Anthropometric and Performance Data Record

Name

Social Insurance Number	Sex	Age	Date of Test	Time of Test (24 Hour Clock)	Room Temperature
2 — 10	11	12 13	D M Y		

Anthropometric Data

Weight (kg) ▶ 14 — 17	Height Standing (cm) ▶ 18 — 21										
Girths (cm) (Optional) ▶	Chest ▶		Abdomen ▶		Gluteal ▶		Thigh ▶				
Skinfolds (mm) ▶	Triceps ▶	1	2	3	Mean	Sub-Scapula ▶	1	2	3	Mean	
	Biceps ▶	1	2	3	Mean	Suprailiac ▶	1	2	3	Mean	
Percent Body Fat ▶ 22 — 24	Ideal Body Weight (kg) ▶ 25 — 28										

Strength — Muscular Endurance — Flexibility

Grip Strength ▶ Right Hand ▶	1	2	Max	Left Hand ▶	1	2	Max	Highest Right and Left ▶	30 — 31	
Push-Ups (Optional) ▶ 32 — 33	Trunk Flexion ▶	1	2	34 Max 36	37	+ Positive - Negative	Sit-Ups (Optional) ▶	38 — 39		

Canada Home Fitness Test

Resting Heart Rate (b/m) ▶ 40 — 42	Resting Blood Pressure ▶	Systolic ▶ 43 — 45	Diastolic ▶ 46 — 48								
Heart Rate Response											
Stage 1	5-15 sec ▶	Stage 2	5-15 sec ▶	Stage 3	5-15 sec ▶	Maximum Oxygen Consumption (ml/kg/min) ▶ 49 — 51					

Post-Exercise

Blood Pressure (Optional) ▶	(0.30-1.00 Min.)	Systolic ▶ 52 — 54	Diastolic ▶ 55 — 57	Post-Ex. Heart Rate (b/m) (5-15 sec.) ▶ 58 — 60							
	(2.30-3.00 Min.)	Systolic ▶ 61 — 63	Diastolic ▶ 64 — 66	Post-Ex. Heart Rate (b/m) (3.00 Min.) ▶ 67 — 69							

Comments

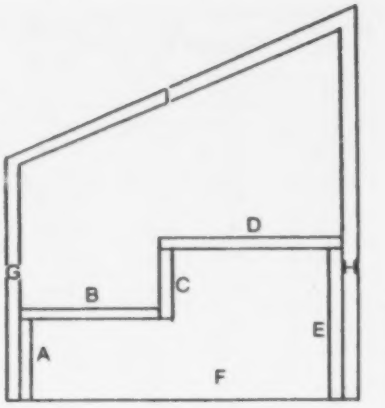
Name of examiner (Please print)	Signature of examiner

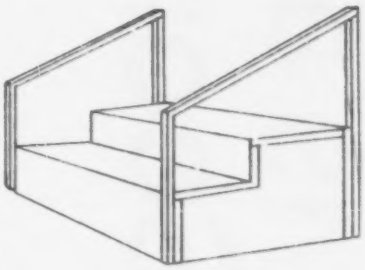
Construction Plan for Ergometer Steps

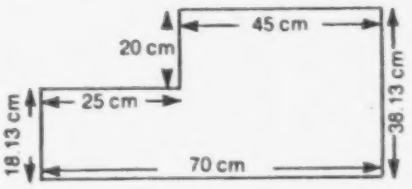
It is advised that steps be constructed in 1.2 meter (4 foot) lengths in order to store and transport easier. In mass testing situations, the smaller stepping benches may be joined to form larger testing benches.

Details

1. Double 20 cm steps, cut to desired length.
2. Use 1.88 cm plywood.
3. Supporting panels (F) every .9-1.2 m.
4. Width Dimensions:
   A 18.13 cm
   B 25 cm
   C 20 cm
   D 45 cm
   E 38.13 cm
   F 70 cm
   } by 1.2 m
5. Handrail Dimensions:
   G Approx. 100 cm
   H Approx. 137.5 cm
6. Support Panel Dimensions

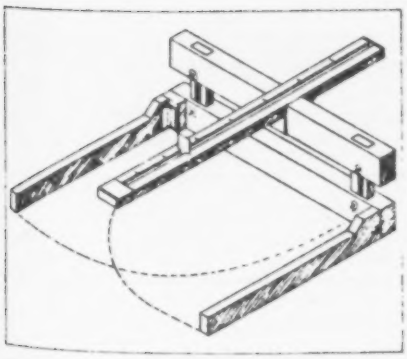


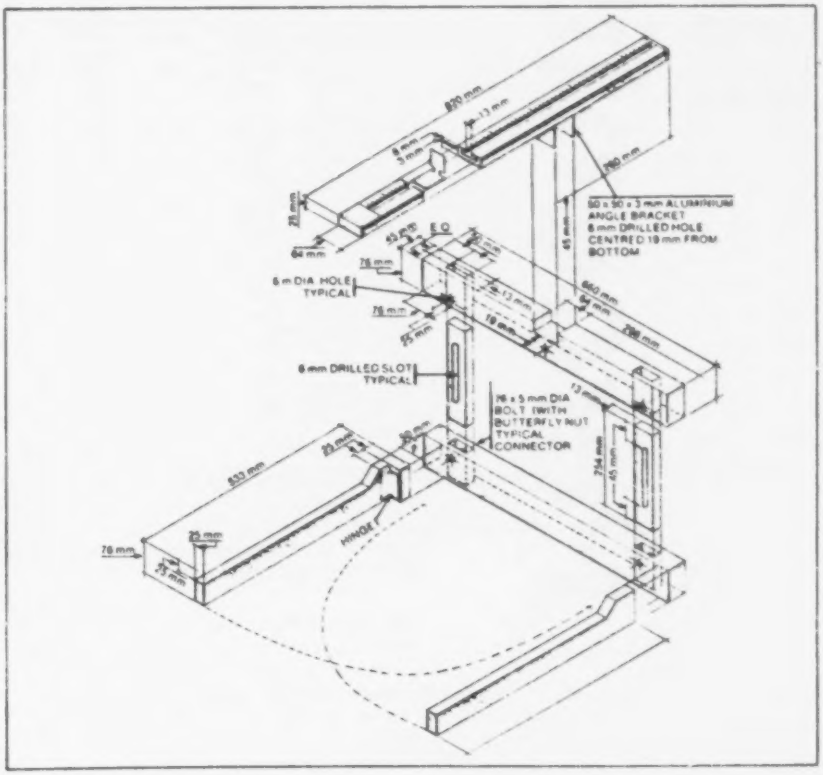




Flexometer Design

A modified Wells and Dillon flexometer may be constructed according to directions herein. It should be noted that the "ruler" arm should be attached at the 25 cm mark (arm extended toward the subject, with the "0" mark closest to the subject).





Norms and Percentile Scores

SCORING CRITERIA

STANDARDIZED TEST OF FITNESS

Body Fat and Skinfolds*

Skinfolds (mm)	Males (age in years)				Females (age in years)			
	17-29	30-39	40-49	50+	16-29	30-39	40-49	50+
15	4.8	—	—	—	10.5	—	—	—
20	8.1	12.2	12.2	12.6	14.1	17.0	19.8	21.4
25	10.5	14.2	15.0	15.6	16.8	19.4	22.2	24.0
30	12.9	16.2	17.7	18.6	19.5	21.8	24.5	26.6
35	14.7	17.7	19.6	20.8	21.5	23.7	26.4	28.5
40	16.4	19.2	21.4	22.9	23.4	25.5	28.2	30.3
45	17.7	20.4	23.0	24.7	25.0	26.9	29.6	31.9
50	19.1	21.5	24.6	26.5	26.5	28.2	31.0	33.4
55	20.1	22.5	25.9	27.9	27.8	29.4	32.1	34.6
60	21.2	23.5	27.1	29.2	29.1	30.6	33.2	35.7
65	22.2	24.3	28.2	30.4	30.2	31.6	34.1	36.7
70	23.1	25.1	29.3	31.6	31.2	32.5	35.0	37.7
75	24.0	25.9	30.3	32.7	32.2	33.4	35.9	38.7
80	24.8	26.6	31.2	33.8	33.1	34.3	36.7	39.6
85	25.5	27.2	32.1	34.8	34.0	35.1	37.5	40.4
90	26.2	27.8	33.0	35.8	34.8	35.8	38.3	41.2
95	26.9	28.4	33.7	36.6	35.6	36.5	39.0	41.9
100	27.6	29.0	34.4	37.4	36.4	37.2	39.7	42.6
105	28.2	29.6	35.1	38.2	37.1	37.9	40.4	43.3
110	28.8	30.1	35.8	39.0	37.8	38.6	41.0	43.9
115	29.4	30.6	36.4	39.7	38.4	39.1	41.5	44.5
120	30.0	31.1	37.0	40.4	39.0	39.6	42.0	45.1
125	30.5	31.5	37.6	41.1	39.6	40.1	42.5	45.7
130	31.0	31.9	38.2	41.8	40.2	40.6	43.0	46.2
135	31.5	32.3	38.7	42.4	40.8	41.1	43.5	46.7
140	32.0	32.7	39.2	43.0	41.3	41.6	44.0	47.2
145	32.5	33.1	39.7	43.6	41.8	42.1	44.5	47.7
150	32.9	33.5	40.2	44.1	42.3	42.6	45.0	48.2
155	33.3	33.9	40.7	44.6	42.8	43.1	45.4	48.7
160	33.7	34.3	41.3	45.1	43.3	43.6	45.8	49.2
165	34.1	34.6	41.6	45.6	43.7	44.0	46.2	49.6
170	34.5	34.8	42.0	46.1	44.1	44.4	46.6	50.0
175	34.9	—	—	—	—	44.8	47.0	50.4
180	35.3	—	—	—	—	45.2	47.4	50.8
185	35.6	—	—	—	—	45.6	47.8	51.2
190	35.9	—	—	—	—	45.9	48.2	51.6
195	—	—	—	—	—	46.2	48.5	52.0
200	—	—	—	—	—	46.5	48.8	52.4
205	—	—	—	—	—	—	49.1	52.7
210	—	—	—	—	—	—	49.4	53.0

In two-thirds of the instances the error was within ±3.5% of the body-weight as fat for the women and ±5% for the men

The equivalent fat content, as a percentage of bodyweight, for a range of values for the sum of four skinfolds (biceps, triceps subscapular and suprailiac) of males and females of different ages

* By J V G A Durnin and J Womersley. "Body fat assessed from total body density and its estimation from skinfold thickness measurements on 481 men and women aged from 16 to 72 years." *British Journal of Nutrition*, 32, 77-97, 1974

Norms and Percentile Scores by Age Groups for Estimated Percentage of Body Fat

	Males[1] Females[2]									
Age (Yr.)	17 - 19		20 - 29		30 - 39		40 - 49		50+	
Obese	⩾ 23	⩾ 29	⩾ 25	⩾ 29	⩾ 27	⩾ 30	⩾ 32	⩾ 31	⩾ 35	⩾ 33
Above Average	18-22	24-28	20-24	24-28	23-26	25-29	27-31	26-30	29-34	27-32
Average	12-17	19-23	15-19	19-23	19-22	20-24	22-26	21-25	23-28	22-26
Ideal	7-11	14-18	9-14	14-18	15-18	14-19	16-21	15-20	17-22	16-21
Slim	⩽ 6	⩽ 13	⩽ 8	⩽ 13	⩽ 14	⩽ 13	⩽ 15	⩽ 14	⩽ 16	⩽ 15

	Age (Yr.)									
Percentile	17 - 19		20 - 29		30 - 39		40 - 49		50+	
100	7.6	9.8	9.9	10.0	10.5	9.2	11.0	10.2	13.7	11.6
95	8.8	15.1	11.1	15.3	15.2	15.0	16.9	16.1	19.2	17.2
90	10.3	16.2	12.6	16.3	16.1	16.1	18.1	17.2	20.3	18.4
85	11.2	17.5	13.5	17.6	17.3	17.6	19.5	18.7	21.7	19.9
80	12.0	18.3	14.2	18.3	18.0	18.4	20.1	19.5	22.5	20.8
75	12.7	18.9	14.9	19.0	18.6	19.1	21.2	20.3	23.2	21.6
70	13.3	19.5	15.4	19.5	19.2	19.8	21.8	20.9	23.8	22.3
65	13.9	20.0	16.1	20.0	19.6	20.4	22.4	21.5	24.3	22.8
60	14.5	20.6	16.6	20.6	20.1	21.0	23.0	22.1	24.9	23.5
55	15.1	21.1	17.2	21.0	20.5	21.5	23.5	22.6	25.4	24.0
50	15.7	21.6	17.7	21.5	21.0	22.0	24.1	23.2	25.9	24.6
45	16.2	22.1	18.3	22.0	21.5	22.6	24.7	23.7	26.4	25.2
40	16.9	22.5	18.9	22.5	21.9	23.1	25.2	24.3	26.9	25.8
35	17.5	23.1	19.5	23.0	22.4	23.7	25.8	24.9	27.5	26.4
30	18.2	23.6	20.1	23.5	22.8	24.3	26.3	25.4	28.0	27.0
25	18.9	24.2	20.9	24.1	23.4	24.9	27.0	26.1	28.7	27.7
20	19.8	24.9	21.8	24.7	24.0	25.6	27.8	26.8	29.3	28.4
15	21.4	25.6	23.3	25.5	24.7	26.5	28.6	27.7	30.2	29.3
10	22.6	27.0	24.4	26.8	25.9	27.9	30.1	29.1	31.6	30.9
5	23.2	28.0	25.9	27.8	26.8	29.1	31.2	30.3	32.6	32.1
0	27.1	33.3	32.9	32.9	34.2	34.9	37.2	36.2	38.2	38.2

[1]1977 Canadian Public Health Association project (5,833 subjects)
[2]1977 Canadian Public Health Association project (3,470 subjects) Percent body fat was determined using the method of Sloan, A.W. et al

Norms and Percentile Scores by Age Groups for Combined Right and Left Hand Grip Strength (kg)

	Males[1] Females[2]											
Age (Yr.)	17 - 19		20 - 29		30 - 39		40 - 49		50 - 59		60 - 65	
Excellent	⩾ 119	⩾ 78	⩾ 123	⩾ 71	⩾ 125	⩾ 72	⩾ 122	⩾ 73	⩾ 113	⩾ 67	⩾ 107	⩾ 60
Good	101-118	61-77	105-122	59-70	106-124	60-71	103-121	59-72	96-112	55-66	90-106	50-59
Minimum	82-100	45-60	87-104	57-58	88-105	48-59	85-102	45-58	78-95	44-54	73-89	39-49
Below minimum	63-81	28-44	68-86	35-46	69-87	36-47	66-84	32-44	61-77	32-43	57-72	28-38
Poor	⩽ 62	⩽ 27	⩽ 67	⩽ 34	⩽ 68	⩽ 35	⩽ 65	⩽ 31	⩽ 60	⩽ 31	⩽ 56	⩽ 27

	Age (Yr.)											
Percentile	17 - 19		20 - 29		30 - 39		40 - 49		50 - 59		60 - 65	
100	138	94	142	83	143	84	140	86	131	78	123	71
95	117	75	121	70	122	70	119	71	111	65	105	59
90	113	72	117	67	118	68	115	68	107	63	101	56
85	107	67	112	63	113	64	110	64	102	59	96	53
80	104	64	109	61	110	62	107	62	99	58	93	52
75	102	62	106	60	107	61	104	60	97	56	91	50
70	99	60	104	58	105	59	102	58	95	54	89	49
65	97	58	102	57	103	58	100	57	93	53	87	47
60	95	56	100	55	101	56	98	55	91	52	85	46
55	93	55	98	54	99	55	96	54	89	51	84	45
50	91	53	96	53	97	54	94	52	87	50	82	44
45	89	51	94	52	95	53	92	51	85	48	80	43
40	87	50	92	50	93	51	90	49	83	47	78	42
35	85	48	90	49	91	50	88	48	81	46	76	41
30	83	46	88	48	89	49	86	46	79	45	75	40
25	81	44	86	46	87	47	84	45	77	44	72	38
20	78	41	83	44	84	45	81	43	75	41	70	37
15	75	39	80	42	81	43	78	40	72	40	67	35
10	69	34	75	39	76	40	73	36	67	36	63	32
5	65	31	71	36	72	37	69	33	63	34	59	30
0	44	12	50	22	51	24	48	18	43	21	40	18

[illegible] Canadian Public Health Association project (18,502 subjects)
[2]1977 Canadian Public Health Association project (3,464 subjects)

...orms and Percentile Scores by ...ge Groups for Maximal Oxygen Consumption (ml/kg/min.)

	Males[1] Females[2]											
...e (Yr.)	17 - 19		20 - 29		30 - 39		40 - 49		50 - 59		60 - 65	
...cellent	⩾ 62	⩾ 43	⩾ 57	⩾ 41	⩾ 49	⩾ 38	⩾ 43	⩾ 35	⩾ 40	⩾ 32	⩾ 36	⩾ 28
...od	55-61	40-42	51-56	38-40	45-48	35-37	40-42	31-34	36-39	27-31	32-35	25-27
...nimum	49-54	37-39	45-50	34-37	40-44	31-34	36-39	28-30	32-35	23-26	28-31	21-24
...low ...nimum	43-48	34-36	39-44	31-33	35-39	28-30	32-35	24-27	28-31	18-22	24-27	17-20
...or	⩽ 42	⩽ 33	⩽ 38	⩽ 30	⩽ 34	⩽ 27	⩽ 31	⩽ 23	⩽ 27	⩽ 17	⩽ 23	⩽ 16

	Age (Yr.)											
...rcentile	17 - 19		20 - 29		30 - 39		40 - 49		50 - 59		60 - 65	
...0	67.9	46.2	63.1	44.5	54.0	41.6	47.4	38.7	43.8	36.3	40.1	32.1
...5	60.8	42.7	56.2	40.5	48.7	37.7	42.9	34.5	39.2	31.2	35.6	27.8
...0	59.4	42.0	54.9	39.7	47.6	37.0	42.0	33.7	38.3	30.2	34.7	27.0
...5	57.7	41.1	53.2	38.7	46.3	36.0	40.9	32.6	37.2	28.9	33.6	25.9
...0	56.6	40.6	52.2	38.1	45.5	35.5	40.3	32.0	36.5	28.2	32.9	25.3
...5	55.7	40.2	51.4	37.7	44.8	35.0	39.7	31.5	35.9	27.6	32.3	24.8
...0	54.9	39.8	50.6	37.2	44.3	34.5	39.2	31.0	35.4	27.0	31.8	24.3
...5	54.3	39.4	50.0	36.8	43.7	34.2	38.8	30.6	35.0	26.5	31.4	23.9
...0	53.5	39.0	49.3	36.4	43.2	33.8	38.3	30.2	34.5	26.0	30.9	23.4
...5	52.9	38.8	48.7	36.1	42.7	33.4	37.9	29.8	34.1	25.5	30.5	23.1
...0	52.2	38.3	48.0	35.7	42.2	33.1	37.5	29.4	33.6	25.0	30.1	22.6
...5	51.5	38.1	47.4	35.3	41.7	32.7	37.0	29.0	33.2	24.6	29.6	22.2
...0	50.9	37.7	46.8	35.0	41.2	32.4	36.6	28.7	32.8	24.1	29.2	21.9
...5	50.2	37.4	46.1	34.6	40.7	32.0	36.2	28.2	32.3	23.6	28.7	21.4
...0	49.5	37.0	45.4	34.2	40.2	31.6	35.8	27.8	31.9	23.1	28.3	21.0
...5	48.7	36.6	44.7	33.8	39.6	31.2	35.3	27.4	31.4	22.5	27.8	20.5
...0	47.8	36.2	43.8	33.3	38.9	30.7	34.7	26.8	30.8	21.9	27.2	20.0
...5	46.7	35.7	42.8	32.7	38.1	30.1	34.0	26.2	30.1	21.1	26.6	19.4
...0	45.0	34.8	41.1	31.7	36.8	29.1	32.9	25.2	29.0	19.9	25.4	18.3
...5	43.6	34.1	39.8	30.9	35.8	28.4	32.0	24.4	28.1	18.9	24.5	17.5
...0	36.5	30.6	33.0	27.0	30.4	24.5	27.5	20.2	23.5	13.8	20.0	13.2

[1] ...977 Canadian Public Health Association project (5,578 subjects)
[2] ...977 Canadian Public Health Association project (3,381 subjects)

Norms and Percentile Scores by Age Groups for Push-Ups

	Males[1] Females[2]											
Age (Yr.)	17 - 19		20 - 29		30 - 39		40 -49		50 - 59		60 - 65	
Excellent	⩾ 51	⩾ 32	⩾ 43	⩾ 33	⩾ 37	⩾ 34	⩾ 31	⩾ 28	⩾ 28	⩾ 23	⩾ 27	⩾ 21
Good	35-50	21-31	30-42	23-32	25-36	22-33	21-30	18-27	18-27	15-22	17-26	13-20
Minimum	19-34	11-20	17-29	12-22	13-24	10-21	11-20	8-17	9-17	7-14	6-16	5-12
Below minimum	4-18	0-10	4-16	1-11	2-12	0-9	1-10	0-7	0-8	0-6	0-5	0-4
Poor	⩽ 3	•	⩽ 3	0	⩽ 1		0	•	•	•	•	•

	Age (Yr.)											
Percentile	17 - 19		20 - 29		30 - 39		40 - 49		50 - 59		60 - 65	
100	65	45	56	44	48	46	41	38	37	32	37	29
95	49	32	41	32	35	32	29	37	26	22	25	20
90	45	31	39	30	33	29	27	24	24	20	23	18
85	41	28	35	26	29	26	25	22	22	18	20	16
80	38	26	33	25	27	24	23	20	20	17	19	14
75	36	25	31	23	26	22	22	19	19	15	17	13
70	34	23	29	22	24	21	20	17	17	14	16	12
65	32	22	28	21	23	20	19	16	16	13	15	11
60	31	21	26	19	22	18	18	15	15	12	14	11
55	29	20	25	18	21	17	17	14	14	12	13	10
50	27	19	23	17	19	16	16	13	13	11	12	9
45	26	17	22	16	18	14	15	12	12	10	10	8
40	24	16	21	15	17	13	14	11	11	9	9	7
35	22	15	19	14	16	12	13	10	10	8	8	6
30	21	14	18	12	14	10	12	9	9	7	7	5
25	19	13	16	11	13	9	11	7	8	6	6	4
20	16	11	14	9	11	7	9	5	7	5	4	3
15	14	9	12	8	9	5	7	4	5	3	3	2
10	9	6	8	5	6	2	5	2	2	1	1	1
5	6	4	6	2	4	1	3	1	1	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0	0

[1]1977 Canadian Public Health Association project (5,253 subjects)
[2]1977 Canadian Public Health Association project (2,641 subjects)

Norms and Percentile Scores by Age Groups for Trunk Flexion (cm)

	Males[1] Females[2]											
Age (Yr.)	17 - 19		20 - 29		30 - 39		40 - 49		50 - 59		60 - 65	
Excellent	≥ 48	≥ 47	≥ 45	≥ 47	≥ 45	≥ 47	≥ 43	≥ 46	≥ 42	≥ 45	≥ 41	≥ 44
Good	37-47	37-46	36-44	37-46	34-44	36-46	32-42	36-45	31-41	35-44	29-40	34-43
Minimum	26-36	28-36	25-35	27-36	24-33	26-35	22-31	25-35	19-30	25-34	18-28	24-33
Below minimum	15-25	19-27	15-24	17-26	13-23	16-25	11-21	14-24	8-18	15-24	6-17	14-23
Poor	≤ 14	≤ 18	≤ 14	≤ 16	≤ 12	≤ 15	≤ 10	≤ 13	≤ 7	≤ 14	≤ 5	≤ 13

	Age (Yr.)											
Percentile	17 - 19		20 - 29		30 - 39		40 - 49		50 - 59		60 - 65	
100	59.0	56.5	56.0	56.5	55.5	57.0	54.0	57.0	53.0	55.5	52.0	54.0
95	46.5	45.5	44.5	45.0	43.5	45.5	42.0	45.0	40.5	44.0	39.0	42.5
90	44.5	43.5	42.0	43.0	41.0	43.0	39.5	42.5	38.0	42.0	36.5	40.0
85	41.5	41.0	39.0	40.5	38.0	40.0	36.5	39.5	35.0	39.0	33.5	37.5
80	39.5	39.5	37.0	38.5	36.5	38.5	34.5	37.5	33.0	37.5	31.5	35.5
75	38.0	38.0	36.0	37.0	35.0	37.0	33.0	36.0	31.5	36.0	30.0	34.5
70	36.5	37.0	35.0	36.0	33.5	36.0	31.5	35.0	30.0	34.5	28.5	33.0
65	35.5	36.0	34.0	35.0	32.5	35.0	30.5	33.5	28.5	33.5	27.0	32.0
60	34.0	35.0	32.5	34.0	31.0	33.5	29.0	32.5	27.5	32.5	26.0	31.0
55	33.0	34.0	31.5	33.0	30.0	32.5	28.0	31.5	26.0	31.5	24.5	30.0
50	32.0	33.0	30.5	32.0	29.0	31.5	27.0	30.0	25.0	30.0	23.5	28.5
45	30.5	32.0	29.5	31.0	28.0	30.0	26.0	29.0	24.0	29.0	22.0	27.5
40	29.5	31.0	28.5	30.0	27.0	29.0	25.0	28.0	22.5	28.0	21.0	26.5
35	28.0	30.0	27.0	28.5	25.5	28.0	23.5	26.5	21.5	27.0	19.5	25.5
30	27.0	29.0	26.0	27.5	24.5	27.0	22.5	25.5	20.0	26.0	18.5	24.5
25	25.5	27.5	25.0	26.0	23.1	26.0	21.0	24.5	18.5	24.5	17.0	23.0
20	24.0	26.0	23.5	25.0	21.5	24.0	19.5	22.5	17.0	23.0	15.5	21.5
15	22.5	24.5	21.5	23.0	20.0	22.5	17.5	21.0	15.0	21.5	13.5	20.0
10	19.0	22.0	19.0	20.5	17.0	20.0	14.5	18.0	12.0	18.5	10.5	17.0
5	17.0	20.0	16.5	18.0	14.5	17.5	12.5	15.5	9.5	16.5	8.0	15.0
0	5.0	9.5	5.0	7.0	2.5	6.0	0.0	3.5	0.0	5.0	0.0	3.5

[1] 1977 Canadian Public Health Association project (5,757 subjects)
[2] 1977 Canadian Public Health Association project (3,445 subjects)

Norms and Percentile Scores by Age Groups for Sit-Ups (No. in 60 seconds)

	Males[1] Females[2]											
Age (Yr.)	17 - 19		20 - 29		30 - 39		40 - 49		50 - 59		60 - 65	
Excellent	⩾ 54	⩾ 46	⩾ 51	⩾ 41	⩾ 44	⩾ 33	⩾ 38	⩾ 28	⩾ 33	⩾ 22	⩾ 33	⩾ 23
Good	44-53	35-45	40-50	31-40	34-43	24-32	29-37	20-27	25-32	14-21	23-32	15-22
Minimum	34-43	24-34	30-39	21-30	25-33	15-23	20-28	12-19	16-24	6-13	13-22	7-14
Below minimum	24-33	14-23	20-29	11-20	15-24	6-14	11-19	3-11	7-15	0-5	4-12	0-6
Poor	⩽ 23	⩽ 13	⩽ 19	⩽ 10	⩽ 14	⩽ 5	⩽ 10	⩽ 2	⩽ 6	•	⩽ 3	•

	Age (Yr.)											
Percentile	17 - 19		20 - 29		30 - 39		40 - 49		50 - 59		60 - 65	
100	63	56	61	51	53	42	47	37	42	32	43	31
95	52	44	49	40	43	32	37	28	32	23	31	22
90	50	42	47	37	40	30	35	26	30	21	29	20
85	48	39	44	35	38	27	32	23	28	19	27	18
80	46	37	42	33	36	26	31	22	26	18	25	17
75	45	36	41	31	35	25	30	21	25	17	24	16
70	43	34	40	30	34	24	26	20	24	16	22	15
65	42	33	38	29	33	23	27	19	23	15	21	14
60	41	32	37	28	31	22	26	18	22	14	20	13
55	40	31	36	27	30	21	25	17	21	13	19	12
50	39	30	35	26	29	20	25	16	20	12	18	11
45	38	29	34	25	28	19	24	15	19	11	17	10
40	37	27	33	24	27	18	23	14	18	11	16	9
35	36	26	32	23	26	17	22	13	17	10	15	8
30	35	25	31	21	25	16	21	12	16	9	14	7
25	34	24	29	20	24	15	19	11	15	8	13	6
20	32	22	28	19	23	13	18	10	14	7	11	5
15	31	20	26	17	21	12	17	8	12	5	10	4
10	28	17	23	14	18	9	14	6	10	3	7	2
5	26	15	21	12	16	7	12	4	8	2	5	1
0	15	3	9	1	5	0	2	0	0	0	0	0

[1]1977 Canadian Public Health Association project (5,684 subjects)
[2]1977 Canadian Public Health Association project (3,194 subjects)

Taping the Stepping Sequences for the Canadian Home Fitness Test

The most efficient system to use in selecting the proper testing tempos for the step test is the taping of the appropriate tempos on audio-cassettes. The table below identifies the seven sequences which are necessary to test all subjects who qualify for the test. The sequences described allow the test administrator to use a three-stage test if required.

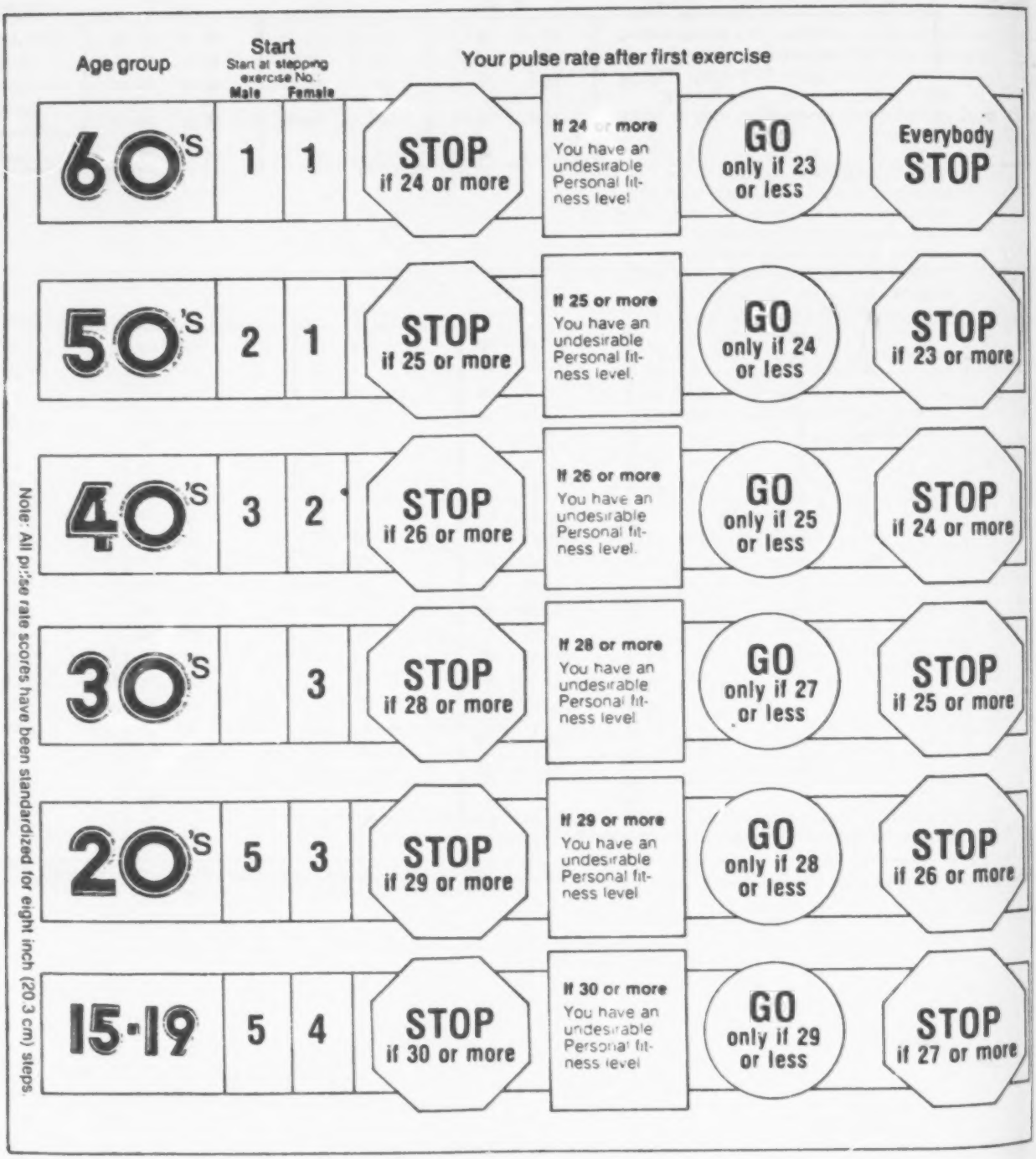
Note. Taping the sequences below should be done continuously from the instructions on the tape or record, "This is stepping exercise number . . ." of the starting tempo until the instruction, "Check your score on the chart to see whether you go on," of the third and final tempo of the stepping sequence. It is mandatory that no interruption occurs in the taping or in the actual administration of the test — except when the test is being terminated according to directions within the test methodology.

Tape	Subjects Being Tested (by age)	Tempos (beats/min.)	STF Tape (Side)*
#1	Males 60s Females 60s, 50s	66,84,102	A or B
#2	Males 50s Females 40s	84,102,114	A or B
#3	Males 40s	102,114,132	A
#4	Males 30s	114,132,144	A
#5	Males 20s, 15-19	132,144,156	A
#6	Females 30s, 20s	102,114,120	B
#7	Females 15-19	114,120,132	B

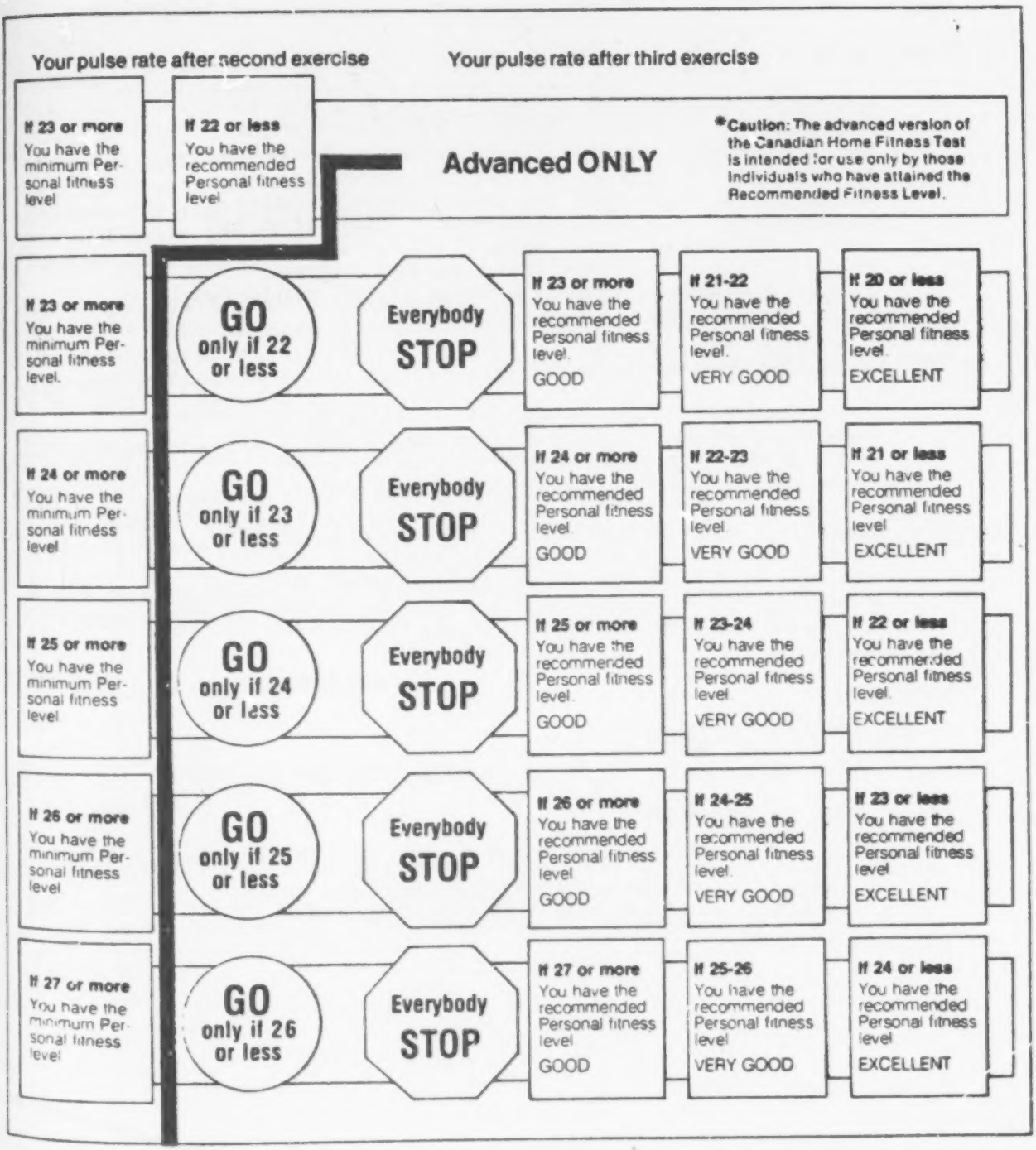
*Each STF Package contains a cassette with the testing tempos. The appropriate side(s) for taping is/are identified within the above table.

Physical Fitness Evaluation Chart: CHFT

This chart summarizes the administration and interpretation of the step test. In a mass testing situation, test administrators may find it easier to use a two-stage rather than a three-stage test. The three-stage test however is mandatory if predictions of maximal oxygen consumption are computed rather than the categorical fitness categories — undesirable, minimum or recommended.


Age group
Start
Start at stepping exercise No.
Male
Female
Your pulse rate after first exercise
60's
1
1
STOP if 24 or more
If 24 or more You have an undesirable Personal fitness level
GO only if 23 or less
Everybody STOP
50's
2
1
STOP if 25 or more
If 25 or more You have an undesirable Personal fitness level.
GO only if 24 or less
STOP if 23 or more
40's
3
2
STOP if 26 or more
If 26 or more You have an undesirable Personal fitness level.
GO only if 25 or less
STOP if 24 or more
30's
3
STOP if 28 or more
If 28 or more You have an undesirable Personal fitness level
GO only if 27 or less
STOP if 25 or more
20's
5
3
STOP if 29 or more
If 29 or more You have an undesirable Personal fitness level
GO only if 28 or less
STOP if 26 or more
15-19
5
4
STOP if 30 or more
If 30 or more You have an undesirable Personal fitness level
GO only if 29 or less
STOP if 27 or more
Note: All pulse rate scores have been standardized for eight inch (20.3 cm) steps.

Test administrators should use their discretion when testing subjects 70 years of age and older. Enquiries should be made about their daily activity habits in addition to the use of PAR-Q. Unless hand-rails are available on the testing steps, the test administrator should step with older subjects as a precaution against falls.


Your pulse rate after second exercise
Your pulse rate after third exercise
If 23 or more
You have the minimum Personal fitness level
If 22 or less
You have the recommended Personal fitness level
Advanced ONLY
*Caution: The advanced version of the Canadian Home Fitness Test is intended for use only by those individuals who have attained the Recommended Fitness Level.
If 23 or more
You have the minimum Personal fitness level.
GO only if 22 or less
Everybody STOP
If 23 or more
You have the recommended Personal fitness level.
GOOD
If 21-22
You have the recommended Personal fitness level.
VERY GOOD
If 20 or less
You have the recommended Personal fitness level.
EXCELLENT
If 24 or more
You have the minimum Personal fitness level
GO only if 23 or less
Everybody STOP
If 24 or more
You have the recommended Personal fitness level.
GOOD
If 22-23
You have the recommended Personal fitness level.
VERY GOOD
If 21 or less
You have the recommended Personal fitness level.
EXCELLENT
If 25 or more
You have the minimum Personal fitness level
GO only if 24 or less
Everybody STOP
If 25 or more
You have the recommended Personal fitness level.
GOOD
If 23-24
You have the recommended Personal fitness level.
VERY GOOD
If 22 or less
You have the recommended Personal fitness level.
EXCELLENT
If 26 or more
You have the minimum Personal fitness level
GO only if 25 or less
Everybody STOP
If 26 or more
You have the recommended Personal fitness level.
GOOD
If 24-25
You have the recommended Personal fitness level.
VERY GOOD
If 23 or less
You have the recommended Personal fitness level.
EXCELLENT
If 27 or more
You have the minimum Personal fitness level
GO only if 26 or less
Everybody STOP
If 27 or more
You have the recommended Personal fitness level.
GOOD
If 25-26
You have the recommended Personal fitness level.
VERY GOOD
If 24 or less
You have the recommended Personal fitness level.
EXCELLENT

MARTEN'S PHYSICAL EDUCATION ATTITUDE SCALE

TYPE OF MEASURE: Affective

OUTCOME ASSESSED: Belief in the Positive Effects of Exercise

TARGET POPULATION: Elementary school children or Adolescents

GENERAL DESCRIPTION:

Marten's Physical Education Attitude Scale is designed to assess children's attitudes about physical education and its benefits. Respondents are presented with 29 statements specifically about physical education, then asked to agree or disagree with each statement. Each item has been given an assigned score value. Mean scores are calculated for the items marked "agree." Those mean scores are then used as the students' attitude ratings.

TECHNICAL INFORMATION:

The scale was administered on a test-retest basis (duration of temporal interval upspecified) to 669 supjects in grades four to seven. The resulting stability coefficient was .68.

To supply evidence of the scales validity, the author correlated scores with students' self-ratings of their additudes toward physical education (by placing an x on a line representing a 0-5 continuum). The resulting validity coefficient (n = 547) was .44.

AUTHORS:

Dr. Fred L. Martens
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ADDITIONAL INFORMATION

Martens, F. L. A scale for measuring attitude toward physical education in the elementary school. Journal of Experimental Education, 1978, 47, 239-247.

MARTEN'S PHYSICAL
EDUCATION ATTITUDE SCALE

by

Fred L. Martens
University of Victoria

NAME _____ DATE _____

SCHOOL _____ GRADE _____

AGE _____

Instructions to the teacher: Distribute the scale and read the instructions carefully with the children. Do the practice statements together. Best results are obtained with grade 4's and some grade 5's if the teacher reads the statements to the children.

Below you will find some statements about physical education. We would like to know how you feel about each statement. Think of physical education as the school course taught in regular periods and not as the games played out of school time and on Saturdays.

(a) Read the statement carefully.

(b) If you agree with the statement, place an "X" in the "agree" column; if you disagree, place an "X" in the "disagree" column.

There are no right or wrong answers. **THIS IS NOT A TEST.** Therefore answer the statement exactly as you feel about it.

PRACTICE ON THESE STATEMENTS:

		Agree	Disagree
1.	Riding a bicycle is more fun than walking.	_____	_____
2.	The study of science is interesting.	_____	_____
3.	Children should not be allowed to watch television after eight o'clock at night.	_____	_____

ANSWER THESE STATEMENTS EXACTLY AS YOU FEEL ABOUT THEM

		Agree	Disagree
1.	I can hardly wait for my next physical education period.	_____	_____
2.	If I had my choice I would not take physical education.	_____	_____
3.	I like practicing skills to become better at doing them.	_____	_____
4.	The only reason I like physical education is to get away from other school work.	_____	_____
5.	In physical education you learn to dislike others who are poorer players than you are.	_____	_____
6.	Playing together in physical education helps you get to like other children better.	_____	_____
7.	I am glad physical education periods are short.	_____	_____
8.	No real good comes out of physical education.	_____	_____
9.	Physical education is needed for learning how to become fit and healthy.	_____	_____
10.	Taking part in most physical education things makes life more fun. (Like games, dance, gymnastics)	_____	_____
11.	Physical education games give you too many chances to get upset and angry at other players.	_____	_____
12.	Learning new stunts and skills is one of the things I like best about physical education.	_____	_____
13.	My body has all the strength it needs without taking part in physical education.	_____	_____

		Agree	Disagree
14.	It does not matter to me if I take exercise or not.	_____	_____
15.	I do not like any part of physical education.	_____	_____
16.	If for any reason a few subjects have to be dropped from the school programme, physical education should be one of the subjects dropped.	_____	_____
17.	Belonging to a team in physical education games makes me feel good.	_____	_____
18.	I enjoy playing and running hard in physical education.	_____	_____
19.	Physical education gives you about the poorest chance of any subject to make friends.	_____	_____
20.	Taking part in the things we do in physical education is helpful in learning how to make friends.	_____	_____
21.	I get a lot of fun out of being able to do the tricks and skills in physical education.	_____	_____
22.	I do not learn anything in physical education that helps me in playing with my friends at home or in playgrounds.	_____	_____
23.	Playing games in physical education just gets you dirty.	_____	_____
24.	Most ways of getting exercise are boring.	_____	_____
25.	Physical education is the only subject I wish we did not have.	_____	_____
26.	Many kinds of exercise (running, playing games hard, doing push-ups, and sit-ups) make me feel better.	_____	_____

		Agree	Disagree
27.	You learn to like exercise in physical education.	_____	_____
28.	Playing games is a waste of time.	_____	_____
29.	Most children look forward to physical education classes.	_____	_____

MARTENS PHYSICAL EDUCATION ATTITUDE SCALE
FOR THE INTERMEDIATE LEVEL

SCORING INSTRUCTIONS

Scale Values for Items

1.	8.13	16.	2.34
2.	1.88	17.	7.80
3.	7.75	18.	6.76
4.	3.04	19.	1.36
5.	1.99	20.	7.59
6.	6.41	21.	7.40
7.	2.87	22.	1.90
8.	2.05	23.	2.38
9.	7.97	24.	2.11
10.	7.81	25.	2.05
11.	2.93	26.	6.90
12.	7.02	27.	7.11
13.	2.84	28.	1.95
14.	4.83	29.	7.56
15.	1.41		

Procedure: Score only the items checked in the "agree" column. The mean of all the scale values of the items agreed with by the student is his/her attitude rating.

EXERCISE QUESTIONNAIRE

TYPE OF MEASURE: Affective

OUTCOME ASSESSED: Intention to Exercise Regularly

TARGET POPULATION: Adults or Adolescents

GENERAL DESCRIPTION:

The Exercise Questionnaire is designed to assess how often existing barriers prevent individuals from exercising regularly. Individuals are presented with fourteen reasons people often cite for not exercising, e.g., lack of energy, lack of time, etc., then asked how often each barrier prevents them from getting exercise. Responses are marked on a continuous line between always and never. The intensity of responses is reflected by where they are placed on the line.

AUTHOR: Department of Health, Hypertension Program
Trenton, New Jersey

EXERCISE QUESTIONNAIRE

II. These are some reasons people cite for not exercising. Please place a check anywhere on the line which best indicates how often these factors prevent you from getting exercise. The intensity of your response is reflected by where it is placed on the line.

For example, if you almost always do not exercise because of a "lack of time," your response would be:

	Always	Often	Sometimes	Rarely	Never
			X		

	Always	Often	Sometimes	Rarely	Never
1. Lack of time ----------					
2. Lack of self-discipline.					
3. Lack of energy --------					
4. Lack of company -------					
5. Lack of motivation ----					
6. Lack of enjoyment from exercise -------					
7. Discouragement --------					
8. Lack of equipment or money ----------					
9. Lack of good weather --					
10. Lack of facilities or space ----------					
11. Lack of knowledge about how to exercise -----					
12. Lack of good health --					
13. Fear of injury --------					
14. Lack of ability to access own level of fitness					
15. Other: _____					

HEALTH ATTITUDES

TYPE OF MEASURE: Affective

OUTCOME ASSESSED: Respect for One's Body

TARGET POPULATION: Adults or Adolescents

GENERAL DESCRIPTION:

Health Attitudes is designed to assess whether individuals are willing to engage in health practices that are indicative of respect for their bodies. Individuals are presented with 62 statements about exercise, nutrition, and stress, then asked whether they strongly agree, somewhat agree, slightly agree, slightly disagree, somewhat disagree, or strongly disagree with each statement. The inventory is comprised of statements such as, "It's hard for me to stick to a regular schedule of physical activity," or "The foods I eat are not as healthy as they could be." This measure is one in a series of health inventories used in the Stanford University Five-City Study, a community-based education project.

AUTHOR: Dr. William Haskell, et al
Stanford University Medical Center

HEALTH ATTITUDES

	Strongly Agree (AA)	Somewhat Agree (A)	Slightly Agree (a)	Slightly Disagree (d)	Somewhat Disagree (D)	Strongly Disagree (DD)	
	(1)	(2)	(3)	(4)	(5)	(6)	
1. The foods that I eat are not as healthy as they could be.	AA	A	a	d	D	DD	(58)
2. It's impossible for me to shut off my thoughts after a hectic day.	AA	A	a	d	D	DD	(59)
3. The amount of physical activity I now get is enough to keep me healthy.	AA	A	a	d	D	DD	(60)
4. I am more aware of my health now than I was a year ago.	AA	A	a	d	D	DD	(61)
5. People who weigh less have lower blood pressure.	AA	A	a	d	D	DD	(62)
6. I just can't keep myself from eating snacks between meals.	AA	A	a	d	D	DD	(63)
7. I would feel much better if I got more exercise.	AA	A	a	d	D	DD	(64)
☐ I feel I already exercise a sufficient amount.							
8. Even though I try, I can't seem to stay calm when annoying things happen.	AA	A	a	d	D	DD	(65)
9. Once you have high blood pressure, you're in for serious health problems unless you control it.	AA	A	a	d	D	DD	(66)
10. It's impossible for me to leave food on my plate.	AA	A	a	d	D	DD	(67)
11. If I decided to use a special relaxation method my family and friends would encourage me to do it.	AA	A	a	d	D	DD	(68)
12. Feeling good is not really related to how much you weigh.	AA	A	a	d	D	DD	(69)
13. I need to learn to feel more comfortable in tense situations.	AA	A	a	d	D	DD	(70)
14. It's hard for me to stick to a regular schedule of physical activity.	AA	A	a	d	D	DD	(71)
15. Most of the people around me are very careful to eat healthy foods.	AA	A	a	d	D	DD	(72)
16. I'm the kind of person who will never get enough exercise.	AA	A	a	d	D	DD	(73)
17. Foods low in salt are bland and uninteresting.	AA	A	a	d	D	DD	(74)
18. It is perfectly OK to gain weight as you get older.	AA	A	a	d	D	DD	(75)
19. I seem to worry about my health more than other people worry about theirs.	AA	A	a	d	D	DD	(76)

	Strongly Agree (AA)	Somewhat Agree (A)	Slightly Agree (a)	Slightly Disagree (d)	Somewhat Disagree (D)	Strongly Disagree (DD)	
	(1)	(2)	(3)	(4)	(5)	(6)	
20. People who don't know how to relax are candidates for a heart attack or stroke.	AA	A	a	d	D	DD	(77)
21. I just cannot resist eating sweet desserts.	AA	A	a	d	D	DD	(78)
22. People who don't get regular physical activity are risking serious health problems.	AA	A	a	d	D	DD	(79)
23. If I only ate things that were good for me, food would be boring.	AA	A	a	d	D	DD	(80)
24. From now on I plan to relax more.	AA	A	a	d	D	DD	(81)
☐ I feel I already relax a sufficient amount.							
25. It is impossible for me to resist eating when I am around others who are eating.	AA	A	a	d	D	DD	(82)
26. People who weigh less have a lower risk of heart disease.	AA	A	a	d	D	DD	(83)
27. When I promise myself to change something about me that I don't like, I always do it.	AA	A	a	d	D	DD	(84)
28. Eating healthy foods is very expensive.	AA	A	a	d	D	DD	(85)
29. I would get along better with people if I didn't get so tense.	AA	A	a	d	D	DD	(86)
30. I just can't do much about what I weigh.	AA	A	a	d	D	DD	(87)
31. If I became a more relaxed person, my general health would probably not change.	AA	A	a	d	D	DD	(88)
32. I worry more about my health now than I did a year ago.	AA	A	a	d	D	DD	(89)
33. People who get easily frustrated have a greater risk of heart disease.	AA	A	a	d	D	DD	(90)
34. If I decided to eat healthier foods, my family and friends would encourage me to do it.	AA	A	a	d	D	DD	(91)
35. Finding enough time to relax is practically impossible for me.	AA	A	a	d	D	DD	(92)
36. Even if I wanted to eat more nutritious foods, changing what I eat would cause my household too much trouble.	AA	A	a	d	D	DD	(93)
37. I just can't get myself to walk short distances instead of driving.	AA	A	a	d	D	DD	(94)
38. During the past year, I have been ill more often than usual.	AA	A	a	d	D	DD	(95)

	Strongly Agree (AA) (1)	Somewhat Agree (A) (2)	Slightly Agree (a) (3)	Slightly Disagree (d) (4)	Somewhat Disagree (D) (5)	Strongly Disagree (DD) (6)	
39. I'd exercise more if I had someone to exercise with.	AA	A	a	d	D	DD	(96)
☐ I feel I already exercise a sufficient amount.							
40. I ought to eat less red meat and eat more fish, poultry and vegetables.	AA	A	a	d	D	DD	(97)
☐ I eat no red meat.							
41. Not getting enough exercise is a serious problem for me.	AA	A	a	d	D	DD	(98)
42. I have trouble keeping myself from eating a lot when I go out to eat.	AA	A	a	d	D	DD	(99)
43. It seems as though almost everything I really enjoy eating is bad for me.	AA	A	a	d	D	DD	(100)
44. I plan to find new ways to get more exercise soon.	AA	A	a	d	D	DD	(101)
☐ I feel I already exercise a sufficient amount.							
45. A balanced diet which leads to weight-loss is bland and uninteresting.	AA	A	a	d	D	DD	(102)
46. My weight is a real problem for me.	AA	A	a	d	D	DD	(103)
47. There is not much I can do to keep from getting sick.	AA	A	a	d	D	DD	(104)
48. If I decided to get more physical activity I know I'd be able to stick to it.	AA	A	a	d	D	DD	(105)
49. I plan to eat healthier food soon.	AA	A	a	d	D	DD	(106)
☐ I feel I already eat sufficiently healthy food.							
50. The way I handle stress is a serious problem for me.	AA	A	a	d	D	DD	(107)
51. I intend to begin a serious weight control program for myself soon.	AA	A	a	d	D	DD	(108)
☐ I am satisfied with my present weight.							
52. It's hard to find the time in a day to get some exercise.	AA	A	a	d	D	DD	(109)
53. If I decided to eat healthier foods, I would probably be very successful in doing it.	AA	A	a	d	D	DD	(110)
54. It takes a great deal of physical activity to make any difference in your weight.	AA	A	a	d	D	DD	(111)
55. When I'm exercising or playing sports, I feel self-conscious about the way I look to others.	AA	A	a	d	D	DD	(112)

	Strongly Agree (AA) (1)	Somewhat Agree (A) (2)	Slightly Agree (a) (3)	Slightly Disagree (d) (4)	Somewhat Disagree (D) (5)	Strongly Disagree (DD) (6)	
56. I really need to lose some weight.	AA	A	a	d	D	DD	(113)
57. I'm the kind of person who doesn't get enough exercise.	AA	A	a	d	D	DD	(114)
58. I feel powerless to prevent myself from eating when I am anxious or unhappy.	AA	A	a	d	D	DD	(115)
59. I'm going to have a regular schedule of physical activity soon.	AA	A	a	d	D	DD	(116)
☐ I already have a regular schedule of physical activity.							
60. It would be very difficult for me to change the kinds of foods I eat.	AA	A	a	d	D	DD	(117)
61. If I lost some weight I would feel much better.	AA	A	a	d	D	DD	(118)
☐ I am satisfied with my present weight.							
62. Soon I'm going to start eating less beef.	AA	A	a	d	D	DD	(119)
☐ I do not eat beef.							

☐ 1 (120)

CHAPTER SEVEN

TEST SPECIFICATIONS

This chapter contains the test specifications for all the newly-developed measures presented in Chapter Five. The specifications are arranged in the same order as that chapter's measures, with the behavioral measure first, followed by knowledge, skill, and affective instruments.

Test specifications describe in detail both what an instrument is to measure and the manner in which the assessment is to be accomplished. Each set of test specifications begins with a General Description, which presents a brief overview of the scope and nature of the measure to be specified. A Sample Item follows, showing a typical item contained in the measure and the directions to respondents that accompany the instrument. The Stimulus Attributes section lists the rules that explain how the items for the measure are to be constructed. The Response Attributes section lists the rules that explain how the response options for the measure are to be constructed.

Many of the sets of specifications have one or more additional sections. A Technical Terms Supplement lists content-specific words which exceed the normal readability restrictions of a measure but which are used because of their importance and relevance. A Specifications Supplement, contained in all knowledge test specifications, presents an exhaustive listing of the content eligible for testing. Knowledge test specifications also contain a Bibliography which cites the references consulted in developing the content listing. Behavioral and affective test specifications include a Scoring and Interpretation section which explains the rationale and procedures to be used in evaluating the measure's data. Some affective test specifications also include a section entitled Measure Format which presents an item-by-item overview of the measure itself, highlighting the different variables represented by each item.

TEST SPECIFICATIONS

WEEKLY ACTIVITIES INDEX

GENERAL DESCRIPTION

Individuals are asked about the frequency, duration, and intensity of their participation in planned exercise activities during the preceding week. Responses to this survey can be used to measure the extent to which individuals maintain an activity level sufficient to promote cardiorespiratory fitness as well as muscular strength and endurance and flexibility.

SAMPLE ITEM

Various activities are listed on the next page. For each activity in which you participated during the past week please record the following:

In the FREQUENCY column: Indicate the number of different times you participated in this activity during the past WEEK.

In the AVERAGE DURATION column: Indicate the average amount of time (in minutes) that you spent per session.

In the INTENSITY column: Indicate how strenuous, on average, the activity was for you, that is, how much effort it required. Record your answer in the INTENSITY column using one of the following letters:

L = Light activity (Small increase in heart and breathing rate)

M = Medium activity (Some increase in heart and breathing rate)

H = Heavy activity (Large increase in heart and breathing rate)

If you participated in other exercise activities that are not included on this list, please write them in the spaces labeled "Other." Fill out the FREQUENCY, AVERAGE DURATION, and INTENSITY columns for each activity you add.

ACTIVITY	FREQUENCY (number/week)	AVERAGE DURATION (minutes)	INTENSITY (L, M, H)
Badminton			

STIMULUS ATTRIBUTES

1. The Weekly Activities Index requires individuals to provide information about the frequency, duration, and intensity of their participation in specific physical activities.

2. The following specific physical activities are listed in the measure: badminton, baseball/softball, basketball, bicycling, bowling, calisthenics (general exercises), dancing, football, golf, handball/racquetball/squash, hiking, jogging/running, judo/karate, rope skipping, rowing, skating, skiing, soccer, stretching, swimming, tennis, volleyball, walking (for exercise), weight training, wrestling, and yoga.

3. Two spaces labeled "Other" are also be available. Respondents are instructed to use these spaces to list any additional activities in which they participated.

RESPONSE ATTRIBUTES

1. Three response columns (FREQUENCY, AVERAGE DURATION, INTENSITY) are provided to the right of each activity.

2. Respondents are to use the FREQUENCY column to indicate the number of times they participated in an activity during the preceding week.

3. Respondents are to use the AVERAGE DURATION column to indicate the average amount of time in minutes spent on an activity.

4. Respondents are to use the INTENSITY column to indicate how strenuous their participation in an activity was, on average, using one of the following letters:

   L = Light activity (Small increase in heart and breathing rate)

   M = Medium activity (Some increase in heart and breathing rate)

   H = Heavy activity (Large increase in heart and breathing rate)

INTERPRETATION

1. The responses to the questionnaire should permit program personnel to assess the current exercise level of respondents in order to determine whether respondents maintain an activity level sufficient to promote cardiorespiratory endurance as well as muscular strength and endurance and flexibility.

2. The appropriate frequency, duration, and intensity of the cardiorespiratory endurance portion of an exercise program are as follows:

   a. The frequency must be at least three sessions per week.

   b. The duration must be at least 20 minutes per session.

   c. The intensity must be strenuous, requiring large increases in heart and breathing rate, as reported by the individual.

3. If a more precise estimate of an activity's intensity is desired, program personnel can use one of several procedures:

   a. The system described by Kenneth Cooper can be employed. This system assigns points according to the cardiovascular benefits from participation in different activities.

   b. The total amount of time spent during the week in activities at each level of intensity can be computed and converted to Kcal energy expenditure using standard values (e.g., 5 Kcal/min for light activities, 10 Kcal/min for strenuous activities.)

   c. Respondents can be asked to indicate their heart rates immediately after they stop exercising and these rates can be interpreted in relation to a target or training heart rate that is 60 to 85% of an individual's maximal heart rate, according to the following formula:

$$\text{Training Heart Rate (per 10-sec. interval)} = \frac{(220 - \text{age}) \times (\% \text{ of maximal heart rate})}{6}$$

4. Responses can also be interpreted according to the extent to which selected activities promote muscular strength and endurance or flexibility.

5. The types of activities included in this measure and the goal(s) met by each are as follows:

	Cardiorespiratory Endurance	Muscular Strength and Endurance	Flexibility
Badminton	x		
Baseball/softball			
Basketball	x		
Bicycling	x	x	
Bowling			
Calisthenics (general exercises)		x	x
Dancing	x	x	
Football			
Golf			
Handball/racquetball/squash	x	x	
Hiking	x	x	
Jogging/running	x	x	
Judo/karate		x	x
Rope skipping	x		
Rowing	x	x	
Skating	x	x	
Skiing (cross-country)	x	x	
Soccer	x	x	
Stretching			x
Swimming	x	x	x
Tennis	x	x	
Volleyball			
Walking (for exercise)	x	x	
Weight training		x	
Wrestling	x	x	
Yoga			x

6. If the questionnaire is also being used by program personnel to assist participants in planning and/or modifying personnel exercise program goals, then the appropriate level of physical activity for each individual should be determined, based upon an individual's age, sex, body composition, and health, as well as the individual's current level of fitness in each fitness component.

TEST SPECIFICATIONS

FACTS ABOUT EXERCISE

GENERAL DESCRIPTION

Individuals are presented with statements about physiological, psychological, and sociological effects of exercise. Individuals indicate whether each statement is true or false.

SAMPLE ITEM

> **This test consists of 20 statements about the effects of exercise. Some of the statements are true and some are false. If you think a statement is true, put a check in the column labeled TRUE. If you think a statement is false, put a check in the column labeled FALSE.**

TRUE	FALSE	
____	____	1. Regular exercise may increase the number of blood vessels that go to the skeletal muscles.

STIMULUS ATTRIBUTES

1. A test item will consist of a single-sentence statement that the individual is to judge as true or false. This statement will contain information related to a potential physiological, psychological or sociological effect of exercise.

2. All test items will be derived from the specifications supplement Facts About Exercise. This supplement presents statements about exercise which are based upon either empirical evidence or expert consensus. The statements are organized into sections, with each section containing information about one area of exercise effects.

3. Each statement on the supplement consists of one main idea related to the effects of exercise. A statement either (a) describes the nature or effects of a particular subject, (b) compares two subjects with respect to a particular attribute, or (c) presents a correlational or causal relationship between two subjects.

4. A test item will be based on a single statement selected from the supplement. If the supplement statement contains multiple parallel elements, only one of the elements will be used in the test item.

Example of a supplement statement with multiple parallel elements

Regular exercise can strengthen the bones, ligaments, and tendons.

5. A test item will present a supplement statement in either accurate or inaccurate form. An accurate test item can be created in one of the following two ways:

   a. Direct restatement: Reiterating a statement exactly as it appears on the supplement.

   b. Paraphrase: Rephrasing a supplement statement to communicate the same message in different words. This rephrasing may include substituting synonyms for words in the statement and/or reordering words within the statement. The quantitative portion of a supplement statement may not be paraphrased.

      Example of a test item created by paraphrase

      Supplement statement: In order to promote cardiorespiratory fitness and improve health, exercise must involve the heart muscle and other parts of the cardiorespiratory system.

      Test Item: Exercise needs to involve the heart muscle and other parts of the cardiorespiratory system in order to produce cardiorespiratory fitness and improve health.

6. An inaccurate test item will be based on a supplement statement or a paraphrase of that statement. An inaccurate item can be created in one of the following two ways:

   a. Negation: Rewording a supplement statement to have the opposite meaning. If the statement is worded positively, negation is accomplished by adding a negative word or phrase to the statement. If the statement is worded negatively, negation is accomplished by taking out a negative word or phrase.

Example of a test item created by negation

Supplement statement: Regular exercise can improve the circulation of blood to the heart and the skeletal muscles.

Test item: Regular exercise cannot improve the circulation of blood to the heart and the skeletal muscles.

b. Mutual exclusivity: Transforming a supplement statement to communicate a message that is mutually exclusive with the original message. This transformation can be accomplished by either (1) changing a single verb, adjective, or adverb in the original statement to a word or phrase with a contradictory meaning, (2) changing a comparative statement to either reverse the direction of the comparison made or make both terms being compared equal, or (3) changing a quantitative value to one that is different than the one given. A quantitative change must result in a new value that makes the original statement false, rather than a value that allows the statement to remain true because it represents a subset of the original statement. A quantitative change must be expressed in the same terms as the original value.

Examples of test items created by transformation to a mutually exclusive statement

Supplement statement: Exercise increases the use of calories.

Test item: Exercise decreases the use of calories.

Supplement statement: Physically inactive individuals are more likely than active individuals to have a heart attack.

Test item: Physically inactive individuals are less likely than active individuals to have a heart attack.

Supplement statement: The cardiovascular benefits of exercise occur only when the exercise program is of sufficient intensity to raise the heart rate to at least 60% of its maximum rate.

Test item: The cardiovascular benefits of exercise occur only when the exercise program is of sufficient intensity to raise the heart rate to at least 90% of its maximum rate.

7. A test item will contain a maximum of 30 words. These words will be no higher than an eighth grade reading level on the IOX Basic Skills Word List. Technical terms not found on the word list may be used only if they are listed on the Technical Terms Supplement.

8. A test will contain an approximately equivalent number of accurate and inaccurate test items. These items will be selected according to the following procedures:

   a. One item will be randomly selected from each section of the supplement.

   b. The rest of the items will be randomly selected from the supplement as a whole.

   c. All of the items will be reviewed by content experts and modified as needed based upon this review.

9. All of the procedures for creating accurate and inaccurate test items will be used as equally as possible, with the exception of negation of a positively-stated supplement statement. This type of change will be used only when no other transformation is possible, as it results in a test item which requires the respondent to recognize that a negatively-stated idea is not accurate, in effect creating a double negative.

RESPONSE ATTRIBUTES

1. Two response columns will be provided. One column will be labeled "TRUE" and the other will be labeled "FALSE."

2. The correct answer to a question will be "TRUE" if the statement is accurate, or "FALSE" if the statement is inaccurate.

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SPECIFICATIONS SUPPLEMENT

FACTS ABOUT EXERCISE

Exercise and Fitness

1. In order to promote cardiorespiratory fitness and to improve health, exercise must involve the heart muscle and other parts of the cardiorespiratory system.

2. A person's physical fitness level refers to how well a person's heart, lungs, muscles, and other organs work, not to how the body looks.

3. A person must exercise regularly in order to be physically fit.

4. Without exercise, the body begins to weaken and has a greater chance of developing certain diseases.

5. Experts agree that regular, moderate exercise is a good form of preventive medicine.

Effects on the Cardiorespiratory System

6. Regular exercise can increase the number of blood vessels that go to the skeletal muscles and increase the amount of blood they can carry to certain parts of the body.

7. Regular exercise can improve the circulation of blood to the heart and the skeletal muscles.

8. Regular exercise can reduce the level of cholesterol in the blood, thereby keeping the blood vessel linings clear of fatty materials.

9. Regular exercise can improve stroke volume, which is the amount of blood pumped with each beat of the heart.

10. Regular exercise can decrease the resting blood pressure.

11. Regular exercise reduces the heart rate at rest and allows an individual to exercise at near maximum rates for longer periods.

12. Regular exercise improves the efficiency of breathing so that fewer breaths are needed to get the same volume of air.

13. Regular exercise increases the maximum amount of oxygen that the body can process while exercising.

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14. Regular exercise can slow down the natural decline in lung capacity that normally occurs with age or inactivity.

15. The cardiovascular improvement effects of exercise are greatest at the beginning of a fitness program, with improvement leveling off after six months to a year.

16. If the frequency, intensity, and/or duration of an exercise program are progressively increased, cardiovascular improvement may continue for several years.

17. All the cardiovascular benefits that result from regular exercise are gradually lost if exercise is not continued.

18. A single exercise session will have no lasting effect on the cardiovascular system.

19. The cardiovascular benefits of exercise occur only when the exercise program is of sufficient intensity to raise the heart rate to at least 60% of its maximum rate.

20. Physically inactive individuals are at greater risk of developing heart disease and high blood pressure than are active individuals.

21. Physically inactive individuals are more likely than active individuals to have a heart attack.

22. Physically inactive individuals are more likely than active individuals to die immediately after a heart attack.

23. Regular exercise may be prescribed to help individuals with asthma and emphysema.

24. Pulse or heart rate at rest is an accepted measure of cardiovascular fitness for most people.

25. Pulse or heart rate can be measured at either the wrist or at one of the blood vessels in the neck.

26. The effects of exercise on the respiratory system are determined by measuring the amount of air a person breathes to perform a standard amount of exercise.

27. The maximum amount of oxygen the body can burn during hard exercise is called maximum oxygen consumption (VO_2 max).

28. Maximum oxygen consumption levels are used as a measure of cardiorespiratory fitness.

Effects on the Muscular/Skeletal System

29. Regular exercise can firm muscles, restore their tone, and increase muscular strength and flexibility.

30. Muscles that are regularly exercised are better able to use fat to produce energy.

31. Regular exercise can reduce minor muscular aches, pains, stiffness, and soreness.

32. Regular exercise can build the muscular strength and endurance necessary to carry on normal daily activities easily and efficiently.

33. Regular exercise can strengthen the bones, ligaments, and tendons.

34. Muscles that are not exercised become smaller, but do not turn into fat.

35. People who are muscularly fit are not necessarily cardiovascularly fit.

36. Regular exercise may help prevent and relieve lower back muscle pain.

37. Regular exercise is sometimes prescribed by doctors to help problems due to arthritis.

38. Regular exercise can correct some problems in posture.

Body Composition and Weight Reduction

39. Body composition is defined as the amount of fat compared to the amount of lean body weight.

40. The percent of fat is a better indicator of appropriate body composition than is total body weight.

41. Lean body weight refers to the amount of non-fat tissue a person has.

42. Exercise increases the number of calories used by an individual.

43. The body will continue to use calories at an increased rate for a short time after exercise has stopped.

44. An individual's lean body weight is usually unchanged by regular exercise.

45. Regular exercise can increase the body's ability to mobilize and use fat.

46. Regular exercise can help reduce excess body fat and total body weight.

47. Weight loss through regular exercise maximizes fat loss and minimizes protein loss.

48. There is little evidence that localized exercise or spot reducing can reduce fat in isolated areas of the body.

49. Regular exercise combined with dieting is more effective than dieting alone for reducing body weight.

50. The number of calories burned during exercise depends on the type of activity, the intensity and duration of the activity, and the individual's body weight.

51. A heavier person uses more calories and fat than a lighter person during comparable exercise periods.

52. The rate of weight loss may be estimated by determining caloric intake and the frequency; duration, and intensity of exercise.

53. Underwater weighing is the most accurate way to measure an individual's body composition.

Psychological and Sociological Effects

54. Exercise is a socially acceptable way of reducing tension.

55. Experts believe that regular exercise can reduce anxiety, stress, and depression.

56. Experts believe that regular exercise is likely to increase a person's self-assertiveness and feelings of self-reliance.

57. A relationship has been found between physical fitness, mental alertness, and emotional well-being.

58. Regular exercise can improve an individual's self-image.

59. Physical fitness has been positively associated with improved work performance and reduced time away from work or school.

60. Exercise can provide the opportunity to meet new friends and spend time with family and friends.

61. Participation in a regular exercise program can improve one's ability to fall asleep quickly and to sleep well.

TECHNICAL TERMS SUPPLEMENT

FACTS ABOUT EXERCISE

arthritis
asthma
cardiorespiratory
cardiovascular
cholesterol
duration
emphysema
expenditure
intensity
ligament
protein
self-assertiveness
stress
tendon
tension

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TEST SPECIFICATIONS

EXERCISE FACTS

GENERAL DESCRIPTION

Children are presented with statements about physical, psychological, and social effects of exercise. Children indicate whether each statement is true or false.

SAMPLE ITEM

> **This test has 15 statements about exercise. If the sentence is correct, put a check under the word TRUE. If the sentence is incorrect, put a check under the word FALSE.**

TRUE	FALSE	
____	____	1. Regular exercise can give a person more blood vessels and more blood.

STIMULUS ATTRIBUTES

1. A test item will consist of a single-sentence statement that the individual is to judge as true or false. This statement will contain information related to a potential physical, psychological or social effect of exercise.

2. All test items will be derived from the specifications supplement Exercise Facts. This supplement presents statements about exercise which are based upon either empirical evidence or expert consensus. The statements are organized into sections, with each section containing information about one area of exercise effects.

3. Each statement on the supplement consists of one main idea related to the effects of exercise. A statement either (a) describes the nature or effects of a particular subject, (b) compares two subjects with respect to a particular attribute, or (c) presents a correlational or causal relationship between two subjects.

4. A test item will be based on a single statement selected from the supplement. If the supplement statement contains multiple parallel elements, only one of the elements will be used in the test item.

Example of a supplement statement with multiple parallel elements

Regular exercise improves the circulation of blood to the heart and muscles.

5. A test item will present a supplement statement in either accurate or inaccurate form. An accurate test item can be created in one of the following two ways:

   a. Direct restatement: Reiterating a statement exactly as it appears on the supplement.

   b. Paraphrase: Rephrasing a supplement statement to communicate the same message in different words. This rephrasing may include substituting synonyms for words in the statement and/or reordering words within the statement. The quantitative portion of a supplement statement may not be paraphrased.

      Example of a test item created by paraphrase

      Supplement statement: In order to improve fitness in the heart and lungs, exercise must make use of the heart and breathing system.

      Test Item: Exercise needs to involve the heart and breathing system in order for fitness in the heart and lungs to occur.

6. An inaccurate test item will be based on a supplement statement or a paraphrase of that statement. An inaccurate item can be created in one of the following two ways:

   a. Negation: Rewording a supplement statement to have the opposite meaning. If the statement is worded positively, negation is accomplished by adding a negative word or phrase to the statement. If the statement is worded negatively, negation is accomplished by taking out a negative word or phrase.

      Example of a test item created by negation

      Supplement statement: Regular exercise can strengthen the bones and body tissues.

      Test item: Regular exercise does not strengthen the bones or body tissues.

b. Mutual exclusivity: Transforming a supplement statement to communicate a message that is mutually exclusive with the original message. This transformation can be accomplished by either (1) changing a single verb, adjective, or adverb in the original statement to a word or phrase with a contradictory meaning, or (2) changing a comparative statement to either reverse the direction of the comparison made or make both terms being compared equal.

Examples of test items created by transformation to a mutually exclusive statement

Supplement statement: Regular exercise strengthens the bones.

Test item: Regular exercise weakens the bones.

Supplement statement: Muscles that are not exercised become smaller but do not turn into fat.

Test item: Muscles that are not exercised become larger but do not turn into fat.

7. A test item will contain a maximum of 22 words. These words will be no higher than a fourth grade reading level on the IOX Basic Skills Word List. Technical terms not found on the word list may be used only if they are listed on the Technical Terms Supplement.

8. A test will contain an approximately equivalent number of accurate and inaccurate test items. These items will be selected according to the following procedures:

   a. One item will be randomly selected from each section of the supplement.

   b. The rest of the items will be randomly selected from the supplement as a whole.

   c. All of the items will be reviewed by content experts and modified as needed based upon this review.

9. All of the procedures for creating accurate and inaccurate test items will be used as equally as possible, with the exception of negation of a positively-stated supplement statement. This type of change will be used only when no other transformation is possible, as it results in a test item which requires the respondent to recognize that a negatively-stated idea is not accurate, in effect creating a double negative.

RESPONSE ATTRIBUTES

1. Two response columns will be provided. One column will be labeled "TRUE" and the other will be labeled "FALSE."

2. The correct answer to a question will be "TRUE" if the statement is accurate, or "FALSE" if the statement is inaccurate.

SPECIFICATIONS SUPPLEMENT

EXERCISE FACTS

Exercise and Fitness

1. In order to improve fitness in the heart and lungs, exercise must make use of the heart and breathing system.

2. Fitness means how well a person's heart and other parts of the body work, not how the person's body looks.

3. A person must exercise regularly in order to be physically fit.

4. Without exercise, a person's body begins to weaken, and the person is more likely to become sick.

5. Experts agree that exercise helps keep a person from becoming sick.

Effects on the Cardiorespiratory System

6. Regular exercise can give a person more blood vessels.

7. Regular exercise can improve the circulation of blood to the heart and muscles.

8. Regular exercise helps the heart to beat more slowly at rest and to have more time between beats.

9. Regular exercise helps to keep the blood vessels free of fats that can slow down the flow of blood.

10. Regular exercise can make the heart pump more blood with each heartbeat.

11. Regular exercise can give a person lower blood pressure.

12. Regular exercise makes the heart stronger so it can be exercised for longer periods of time.

13. Regular exercise allows a person to take fewer breaths to get the same amount of air.

14. Regular exercise allows the body to use more oxygen while exercising.

15. Regular exercise can help keep the lungs healthy as a person gets older.

16. Exercise helps the heart and blood circulation most during the first six months to a year of an exercise program.

17. Improvements in the fitness of the heart and blood circulation may continue for several years if a person keeps exercising more often, harder, or longer.

18. If regular exercise is stopped, the heart and blood circulation will no longer be helped and they will return to the way they were.

19. Exercising only once will not help the heart or blood circulation.

20. In order to help the heart, lungs, and circulation, exercise must be done often enough, hard enough, and long enough.

21. People who do not exercise are more likely than people who exercise to have heart disease and high blood pressure.

22. People who do not exercise are more likely than people who exercise to have a heart attack.

23. People who do not exercise are more likely than people who exercise to die right after a heart attack.

24. Doctors often tell people with breathing problems to exercise regularly.

25. A person's pulse or heart rate at rest can be used to measure heart and blood circulation fitness.

26. The pulse or heart rate can be measured at either the wrist or neck.

27. A person can tell how exercise helps the lungs by measuring the amount of oxygen the body uses during an exercise program.

28. The greatest amount of oxygen the body can use during hard exercise is used to measure the fitness of the lungs and breathing system.

Effects on the Muscular/Skeletal System

29. Regular exercise can make muscles stronger and more flexible.

30. Muscles that are regularly exercised are better able to use fat to give a person energy.

31. Regular exercise can help a person feel less muscular ache, pain, stiffness, and soreness.

32. Regular exercise can strengthen the bones and body tissues.

33. Muscles that are not exercised become smaller, but do not turn into fat.

34. People who have strong muscles do not necessarily have heart, lung, or circulation fitness.

35. Regular exercise may help a person avoid lower back pain.

36. Doctors often tell people with arthritis to exercise in order to have less pain.

37. Regular exercise can sometimes correct posture problems and is necessary for good posture.

38. Good posture as a child can keep a person from having back pains as an adult.

Effects on Body Composition and Weight Reduction

39. Body composition has to do with the amount of fat and muscle a person has.

40. The amount of fat in the body is better than total weight to figure out a person's lean body weight.

41. Lean body weight is the amount of non-fat tissue a person has.

42. Exercise causes the body to use up more calories.

43. The body will use more calories than usual for a short time after exercise has stopped.

44. Regular exercise helps a person lose fat and lose weight.

45. When a person loses weight by exercising, the person loses fat but not muscle.

46. Regular exercise along with dieting is better than just dieting for losing weight.

47. The number of calories used up during exercise depends on the type of exercise, how hard and long the person exercises, the person's weight, and the person's level of fitness.

48. A heavier person uses more calories than a lighter person during the same exercise periods.

49. It is possible to tell how fast a person will lose weight by knowing how much a person eats and how often, how long, and how hard the person exercises.

50. Underwater weighing is the best way to measure a person's body composition.

Psychological and Sociological Effects

51. Being fit helps a person reduce tension.

52. Experts believe that regular exercise helps a person feel stronger and more able to do things.

53. People who are fit are usually also quick, active, and happy.

54. Regular exercise can make people feel better about themselves.

55. People who are fit usually miss less school or work and do better work.

56. Exercise can help a person to meet new friends and to spend more time with family and friends.

57. Regular exercise can help a person fall asleep quickly and sleep well.

TECHNICAL TERMS SUPPLEMENT

EXERCISE FACTS

arthritis
blood pressure
body composition
breathing system
calories
circulation
dieting
energy
heart disease
heart rate
lungs
muscle
muscular
oxygen
posture
pulse
tension
tissue
vessel

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TEST SPECIFICATIONS

DESIGNING AN EXERCISE PROGRAM

GENERAL DESCRIPTION

Individuals are presented with statements about exercise program components and the factors relating to activity selection and implementation. Individuals indicate whether each statement is true or false.

SAMPLE ITEM

> **This test consists of 20 statements about exercise program design. Some of the statements are true and some are false. If you think a statement is true, put a check in the column labeled TRUE. If you think a statement is false, put a check in the column labeled FALSE.**

TRUE	FALSE		
____	____	1.	Different sports and activities provide different benefits.

STIMULUS ATTRIBUTES

1. A test item will consist of a single-sentence statement that the individual is to judge as true or false. This statement will contain information related to an aspect of exercise program design.

2. All test items will be derived from the specifications supplement Designing an Exercise Program. This supplement presents statements about exercise program design which are based upon either empirical evidence or expert consensus. The statement are organized into sections, with each section containing information about one aspect of exercise program design.

3. Each statement on the supplement consists of one main idea related to exercise program design. A statement either (a) describes the nature or effects of a particular subject, (b) compares two subjects with respect to a particular attribute, or (c) presents a correlational or causal relationship between two subjects.

4. A test item will be based on a single statement selected from the supplement. If the supplement statement contains multiple parallel elements, only one of the elements will be used in the test item.

   Example of a supplement statement with multiple parallel elements

   Individuals who have heart or blood vessel trouble, uncontrolled high blood pressure, bone or joint problems, a family history of premature coronary artery disease, or who are over age 30 and not accustomed to vigorous exercise, should consult a doctor before starting an exercise program.

5. A test item will present a supplement statement in either accurate or inaccurate form. An accurate test item can be created in one of the following two ways:

   a. Direct restatement: Reiterating a statement exactly as it appears on the supplement.

   b. Paraphrase: Rephrasing a supplement statement to communicate the same message in different words. This rephrasing may include substituting synonyms for words in the statement and/or reordering words within the statement. The quantitative portion of a supplement statement may not be paraphrased.

      Example of a test item created by paraphrase

      Supplement statement: The intensity of exercise can be monitored by measuring the heart rate.

      Test Item: The heart rate can be used to monitor the intensity of exercise.

6. An inaccurate test item will be based on a supplement statement or a paraphrase of that statement. An inaccurate item can be created in one of the following two ways:

   a. Negation: Rewording a supplement statement to have the opposite meaning. If the statement is worded positively, negation is accomplished by adding a negative word or phrase to the statement. If the statement is worded negatively, negation is accomplished by taking out a negative word or phrase.

Example of a test item created by negation

Supplement statement: Bowling will not improve one's cardiorespiratory endurance capacity.

Test item: Bowling will improve one's cardiorespiratory endurance capacity.

b. Mutual exclusivity: Transforming a supplement statement to communicate a message that is mutually exclusive with the original message. This transformation can be accomplished by either (1) changing a single verb, adjective, or adverb in the original statement to a word or phrase with a contradictory meaning, (2) changing a quantitative value to one that is different than the one given. A quantitative change must result in a new value that makes the original statement false, rather than a value that allows the statement to remain true because it represents a subset of the original statement. A quantitative change must be expressed in the same terms as the original value.

Examples of test items created by transformation to a mutually exclusive statement

Supplement statement: Cardiorespiratory endurance activities are the most important part of any health-focused exercise program.

Test item: Cardiorespiratory endurance activities are the least important part of any health-focused exercise program.

Supplement statement: The target level for a healthy person for building cardiorespiratory endurance is 60 to 85% of one's maximum heart rate.

Test item: The target level for a healthy person for building cardiorespiratory endurance is 30 to 50% of one's maximum heart rate.

7. A test item will contain a maximum of 25 words. These words will be no higher than an eighth grade reading level on the IOX Basic Skills Word List. Technical terms not found on the word list may be used only if they are listed on the Technical Terms Supplement.

8. A test will contain an approximately equivalent number of accurate and inaccurate test items. These items will be selected according to the following procedures:

a. One item will be randomly selected from each section of the supplement.

b. The rest of the items will be randomly selected from the supplement as a whole.

c. All of the items will be reviewed by content experts and modified as needed based upon this review.

9. All of the procedures for creating accurate and inaccurate test items will be used as equally as possible, with the exception of negation of a positively-stated supplement statement. This type of change will be used only when no other transformation is possible, as it results in a test item which requires the respondent to recognize that a negatively-stated idea is not accurate, in effect creating a double negative.

RESPONSE ATTRIBUTES

1. Two response columns will be provided. One column will be labeled "TRUE" and the other will be labeled "FALSE."

2. The correct answer to a question will be "TRUE" if the statement is accurate, or "FALSE" if the statement is inaccurate.

SPECIFICATIONS SUPPLEMENT

DESIGNING AN EXERCISE PROGRAM

Program Design/Activity Selection

1. Selecting an exercise program without proper guidance or participating in an activity program where everyone exercises at the same level of intensity can be dangerous or ineffective.

2. The selection of activities for an exercise program should be based on the following characteristics: the individual's health, physical fitness level, age, desired benefits, preference for individual or team activities, preference for indoor or outdoor activities, and available time, money, and equipment.

3. An individual's exercise program should specify recommended types of activities, frequency of participation, intensity of effort, length of each session, and length of total program.

4. Cardiorespiratory endurance activities are the most important part of any health-focused exercise program.

5. A conditioning program can be designed to build either cardiovascular fitness or muscular strength and fitness.

6. A maintenance program maintains and possibly improves the fitness levels obtained through conditioning activities.

7. Different sports and activities provide different benefits.

8. The benefits of exercise depend upon the following factors: the type of activity, the number of days per week a person exercises (frequency), the level of effort at which an activity is performed (intensity), and the length of each exercise session (duration).

9. Individuals who exercise regularly will reach a point where their fitness level no longer increases unless the frequency, duration, or intensity of their activity program is increased.

Medical Evaluation and Clearance for Exercise

10. Individuals who have heart or blood vessel trouble, uncontrolled high blood pressure, bone or joint problems, a family history of coronary artery disease, or who are over 30 years old and not accustomed to vigorous exercise, should consult a doctor before starting an exercise program.

11. Individuals who experience pains in the chest during or after exercising, fainting spells, or extreme breathlessness after mild exercise should consult a doctor before starting or continuing an exercise program.

12. The need for a medical examination before an individual begins an exercise program depends on the age and health of the individual and the type of activity program planned.

Exercise Program Components

13. An exercise program should include a warm-up period, an endurance period, a cool-down period, and, if desired, a strength conditioning period.

14. The warm-up period of an exercise session should last from 5 to 15 minutes.

15. The warm-up period of an exercise session should begin with easy stretching exercises and end with more vigorous calisthenics.

16. Warm-up exercises increase muscular flexibility and gradually prepare the body for endurance conditioning.

17. Beginning each exercise session with a warm-up period will help decrease the muscle and joint soreness often felt when first starting an exercise program.

18. A cool-down period helps the blood return to the heart.

19. Cool-down activities help relieve current soreness and prevent future soreness.

20. Cool-down exercises usually consist of easy jogging or walking.

Cardiorespiratory Conditioning

21. Cardiorespiratory endurance refers to the ability of the body to sustain prolonged rhythmical exercise and to efficiently produce and distribute energy.

22. In order to provide the most benefit, cardiorespiratory endurance activities must be repeated at least three times per week.

23. After cardiorespiratory fitness has been achieved, it is generally safe to increase the frequency of cardiorespiratory activities to five or six times a week.

24. An exercise program must allow time for muscle recovery by controlling the frequency of activity.

25. Cardiorespiratory endurance activities should maintain the heart rate at its target level for at least 20 minutes.

26. The target level for a healthy person building cardiorespiratory endurance is 60 to 85 percent of one's maximum heart rate.

27. The intensity of exercise can be monitored by measuring the heart rate.

28. A person's target heart rate is the heart rate at which that individual should exercise to obtain the greatest cardiovascular benefit.

29. Everyone does not have the same target heart rate.

30. Individuals exercising below their target heart rates show little improvement in cardiorespiratory fitness.

31. Exercising at 85 percent or more of one's maximum heart rate may be dangerous unless an individual is in excellent physical condition.

32. Brisk walking, skipping rope, race walking, running, uphill hiking, swimming, bicycling, cross-country skiing, ice hockey, and rowing will improve one's cardiorespiratory endurance capacity.

33. If played vigorously and without interruption, handball, racquetball, squash, badminton, tennis, and basketball will improve one's cardiorespiratory endurance capacity.

34. Baseball, bowling, football, golf, softball, and volleyball will not improve one's cardiorespiratory endurance capacity.

Muscular Endurance and Strength Conditioning

35. Muscular endurance refers to the ability of a particular muscle or muscle group to sustain prolonged exercise.

36. Muscular endurance can be promoted by repeating activities which require strength.

37. Muscular strength is the ability of a particular muscle group to exert force or move a heavy weight one time.

38. Muscular strength can be promoted through activities which require muscle groups to exercise against heavy resistance.

39. Bicycling, handball, racquetball, squash, running, skating, skiing, swimming, tennis, walking, calisthenics, and weight training can improve some muscular strengths and endurances.

40. Individuals should perform muscular strength and endurance activities a minimum of two days a week to maintain muscular fitness.

Flexibility Conditioning

41. Flexibility is the ability to move a particular joint in the body through its full range of motion.

42. Flexibility is most safely promoted through activities which require a joint to move slowly through its full range of motion.

43. Calisthenics, judo, karate, swimming, and yoga improve muscular flexibility.

44. Individuals should perform flexibility activities daily to maintain flexibility.

TECHNICAL TERMS SUPPLEMENT

DESIGNING AN EXERCISE PROGRAM

calisthenics
cardiorespiratory
cardiovascular
conditioning
coronary artery disease
duration
gymnastics
intensity
judo
karate
maximum heart rate
muscular
target zone
yoga

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TEST SPECIFICATIONS

INJURY PREVENTION

GENERAL DESCRIPTION

Individuals are presented with statements about exercise-related health risks and injury prevention strategies associated with cardiovascular, muscular/skeletal, and environmental problems. Individuals indicate whether each statement is true or false.

SAMPLE ITEM

> **This test consists of 20 statements about exercise and injury prevention. Some of the statements are true and some are false. If you think a statement is true, put a check in the column labeled TRUE. If you think a statement is false, put a check in the column labeled FALSE.**

TRUE	FALSE	
____	____	1. Heat stroke occurs when the body is unable to regulate its rising temperature.

STIMULUS ATTRIBUTES

1. A test item will consist of a single-sentence statement that the individual is to judge as correct or incorrect. This statement will contain information about the nature of exercise-related health risks or the prevention of cardiovascular, muscular/skeletal, and temperature induced injuries caused by exercise.

2. All test items will be derived from the specifications supplement Injury Prevention. This supplement presents statements about exercise-related health risks and injury prevention strategies which are based upon either empirical evidence or expert consensus. The statements are organized into sections, with each section containing information about one aspect of injury prevention.

3. Each statement on the supplement consists of one main idea related to an exercise health risk or injury prevention strategy. A statement either (a) describes the nature or effects of a particular subject, (b) compares two subjects with respect to a particular attribute, or (c) presents a correlational or causal relationship between two subjects.

4. A test item will be based on a single statement selected from the supplement. If the supplement statement contains multiple parallel elements, only one of the elements will be used in the test item.

   Example of a supplement statement with multiple parallel elements

   Environmental factors that increase the risk of heat stress include high air temperature, high humidity, little air movement, and a lack of cloud cover.

5. A test item will present a supplement statement in either accurate or inaccurate form. An accurate test item can be created in one of the following two ways:

   a. Direct restatement: Reiterating a statement exactly as it appears on the supplement.

   b. Paraphrase: Rephrasing a supplement statement to communicate the same message in different words. This rephrasing may include substituting synonyms for words in the statement and/or reordering words within the statement.

      Example of a test item created by paraphrase

      Supplement statement: Dehydration or the loss of body fluids is the major cause of heat disorders.

      Test Item: The primary cause of heat disorders is dehydration, or the body's loss of fluids.

6. An inaccurate test item will be based on a supplement statement or a paraphrase of that statement. An inaccurate item can be created in one of the following two ways:

   a. Negation: Rewording a supplement statement to have the opposite meaning. If the statement is worded positively, negation is accomplished by adding a negative word or phrase to the statement. If the statement is worded negatively, negation is accomplished by taking out a negative word or phrase.

Example of a test item created by negation

Supplement statement: Exercise in low temperatures can lead to frostbite and hypothermia.

Test item: Exercise in low temperatures cannot lead to frostbite and hypothermia.

b. Mutual exclusivity: Transforming a supplement statement to communicate a message that is mutually exclusive with the original message. This transformation can be accomplished by either (1) changing a single verb, adjective, or adverb in the original statement to a word or phrase with a contradictory meaning, (2) changing a comparative statement to either reverse the direction of the comparison made or make both terms being compared equal.

Examples of test items created by transformation to a mutually exclusive statement

Supplement statement: Heat cramps are the least serious of the heat disorders.

Test item: Heat cramps are the most serious of the heat disorders.

Supplement statement: Exercising in cold temperatures is generally less of a health risk than exercising in hot weather.

Test item: Exercising in hot weather is generally less of a health risk than exercising in cold temperatures.

7. A test item will contain a maximum of 25 words. These words will be no higher than an eighth grade reading level on the IOX Basic Skills Word List. Technical terms not found on the word list may be used only if they are listed on the Technical Terms Supplement.

8. A test will contain an approximately equivalent number of accurate and inaccurate test items. These items will be selected according to the following procedures:

a. One item will be randomly selected from each section of the supplement.

b. The rest of the items will be randomly selected from the supplement as a whole.

c. All of the items will be reviewed by content experts and modified as needed based upon this review.

9. All of the procedures for creating accurate and inaccurate test items will be used as equally as possible, with the exception of negation of a positively-stated supplement statement. This type of change will be used only when no other transformation is possible, as it results in a test item which requires the respondent to recognize that a negatively-stated idea is not accurate, in effect creating a double negative.

RESPONSE ATTRIBUTES

1. Two response columns will be provided. One column will be labeled "TRUE" and the other will be labeled "FALSE."

2. The correct answer to a question will be "TRUE" if the statement is accurate, or "FALSE" if the statement is inaccurate.

SPECIFICATIONS SUPPLEMENT

INJURY PREVENTION

Exercise in the Heat

1. Much of the heat produced by the body during exercise is lost through evaporation of sweat.

2. During exercise in humid weather, sweat evaporates slowly and body temperature begins to rise.

3. Heat stress can occur when the body can no longer regulate its temperature.

4. Environmental factors that increase the risk of heat stress include high air temperature, high humidity, little air movement, and a lack of cloud cover.

5. Individual factors influencing the development of heat stress include the intensity and duration of exercise, the extent of previous exposure to similar environmental conditions, and the amount of fluid intake both before and during exercise.

6. Each person responds differently to exercising in the heat because of differences in amounts of body fat, the number of sweat glands, and fitness level.

7. Physically fit individuals have fewer problems than unfit individuals during exercise in hot surroundings because the bodies of fit individuals are better able to regulate body temperature.

8. Heavily muscled individuals and overweight individuals lose the most water during exercise in hot surroundings and are especially in danger of developing serious heat problems.

Heat Related Disorders

9. Dehydration or the loss of body fluids is the major cause of heat disorders.

10. Heat cramps, heat exhaustion, and heat stroke are heat disorders which occur when the body cannot adapt to heat stress.

11. Heat cramps are the least serious of the heat disorders.

12. Heat cramps are usually a direct result of salt and water loss from dehydration.

13. Heat cramps are painful spasms of skeletal muscles, occuring most commonly in the calf muscle.

14. Heat exhaustion occurs when the amount of sweat produced decreases.

15. Heat exhaustion is the first sign that the body is beginning to lose its ability to regulate temperature and cope with heat stress.

16. Heat exhaustion is characterized by extreme weakness, breathlessness, dizziness, rapid pulse, and a body temperature around 101°F.

17. Heat stroke occurs when the body is unable to regulate its rising temperature.

18. Heat stroke is characterized by hot dry skin, a body temperature of 105°F or higher, a failure to sweat, increasing confusion, and eventual unconsciousness.

19. If not treated immediately, heat stroke can lead to permanent brain damage or death.

20. The early warning symptoms of heat disorders include goose bumps on the chest and upper arms, chills, throbbing pressure in the head, unsteadiness, nausea, and dry skin.

21. Heat cramps, exhaustion, and stroke are less likely to occur if an individual drinks enough liquids to replace those lost in exercising.

22. An individual should drink large quantities of liquids before, during, and following exercise in the heat.

23. Body fluids lost during exercise can be replaced by drinking either water, juice, soda, or electrolyte solutions.

24. Individuals who work or exercise for long hours in the heat may need to replace body salts lost in sweating.

25. Individuals should stop exercising as soon as they feel symptoms of heat stress.

26. Individuals can avoid heat disorders on hot and humid days by exercising in the cooler parts of the day, exercising less than normal, and wearing light, loose fitting clothes.

27. The chances of developing heat disorders increase if an individual wears rubberized or plastic suits, sweat shirts, or sweat pants while exercising in hot weather.

Exercise in the Cold

28. Cold stress occurs when the body begins to lose heat faster than it is produced.

29. Cold stress is a result of low environmental temperatures, the wind chill factor, and either very high or very low humidity.

30. Exercising in cold temperatures is generally less of a health risk than exercising in hot weather.

Cold Related Disorders

31. Exercise in low temperatures can lead to frostbite and hypothermia.

32. Hypothermia is the reduction of internal body temperature which can lead to confusion, loss of consciousness, and death.

33. Individuals who exercise outdoors on cold days should wear several layers of clothing, keep their hands covered, and wear a hat.

34. Individuals exercising in extreme cold should wear tightly woven clothes and thermal underwear.

Exercise at High Altitudes

35. Exercise at high altitudes reduces performance capabilities until the individual adapts to the altitude.

36. Symptoms of altitude sickness include headache, shortness of breath, rapid heartbeat, and loss of appetite.

37. Individuals unaccustomed to high altitudes should lower the duration and intensity of their cardiorespiratory activities while at high altitudes.

Muscular/Skeletal Disorders

38. Muscular injuries caused by exercise include muscle soreness, muscle cramps, muscle bruises, and torn muscles.

39. Skeletal injuries caused by exercise include bone bruises, broken bones, shin splints, and stress fractures.

40. Tendinitis, bursitis, and blisters, are common joint and skin injuries caused by exercise.

41. Muscular, skeletal, joint, and skin injuries often occur when an individual either is not properly trained for a particular level or type of stress or uses improper techniques or equipment.

42. Pains in the joints, feet, ankles, or legs indicate that an individual should stop or reduce exercising.

43. Muscular and skeletal injuries due to improper equipment can be prevented if the equipment used for specific exercise activities is properly designed, constructed, and fitted.

44. Learning the rules of a game and the proper ways to move and position the body during play can help prevent muscular and skeletal injuries.

45. Warm-up exercises stretch and limber the muscles, increase body temperature, and speed up blood flow to the heart, lungs, and muscles.

46. Warm-up exercises help prevent muscle, tendon, and ligament strains.

47. Cool-down exercises continue the circulation of the blood to the muscles.

48. Cool-down exercises guard against the pooling of blood in the legs and reduce the risk of muscle cramps.

Cardiovascular Problems

49. Individuals who have been inactive and who are starting an exercise program should do so gradually, beginning with less vigorous activities.

50. Being in the proper physical condition to handle the physical stress associated with a particular exercise program can help prevent the onset of cardiovascular problems.

51. During an exercise session individuals should gradually increase the intensity of activity and cool down slowly to prevent the possible onset of cardiovascular problems.

52. Individuals should call a doctor immediately if they unusual shortness of breath, discomfort or pain in the left or midchest area, or discomfort or pain in the left neck, shoulder, or arm during or just after exercising.

TECHNICAL TERMS SUPPLEMENT

INJURY PREVENTION

bursitis
cardiovascular
dehydration
electrolyte solutions
hypothermia
ligament
spasms
tendinitis
tendon

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TEST SPECIFICATIONS

AVOIDING INJURY

GENERAL DESCRIPTION

Children are presented with statements about the nature of exercise-related health risks and injury prevention strategies associated with cardiovascular, muscular/skeletal, and environmental problems. Children indicate whether each statement is true or false.

SAMPLE ITEM

> **This test has 15 sentences. Read each one. If the sentence is correct, put a check under the word TRUE. If the sentence is incorrect, put a check under the word FALSE.**

TRUE	FALSE	
____	____	1. Frostbite is the freezing of a part of the body, usually the fingers or toes.

STIMULUS ATTRIBUTES

1. A test item will consist of a single-sentence statement that the child is to judge as correct or incorrect. This statement will contain information about the nature of exercise-related health risks or the prevention of cardiovascular, muscular/skeletal, and temperature induced injuries caused by exercise.

2. All test items will be derived from the specifications supplement Avoiding Injury. This supplement presents statements about exercise-related health risks and injury prevention strategies which are based upon either empirical evidence or expert consensus. The statements are organized into sections, with each section containing information about one aspect of injury prevention.

3. Each statement on the supplement consists of one main idea related to an exercise health risk or injury prevention strategy. A statement either (a) describes the nature or effects of a particular subject, (b) compares

two subjects with respect to a particular attribute, or (c) presents a correlational or causal relationship between two subjects.

4. A test item will be based on a single statement selected from the supplement. If the supplement statement contains multiple parallel elements, only one of the elements will be used in the test item.

   Example of a supplement statement with multiple parallel elements

   Some signs of altitude sickness are headache, breathlessness, fast heart beat, and not being hungry.

5. A test item will present a supplement statement in either accurate or inaccurate form. An accurate test item can be created in one of the following two ways:

   a. Direct restatement: Reiterating a statement exactly as it appears on the supplement.

   b. Paraphrase: Rephrasing a supplement statement to communicate the same message in different words. This rephrasing may include substituting synonyms for words in the statement and/or reordering words within the statement.

      Example of a test item created by paraphrase

      Supplement statement: Dehydration or the loss of too much water from the body is the greatest cause of heat problems.

      Test Item: The major cause of heat problems is dehydration, or the loss of too much water from the body.

6. An inaccurate test item will be based on a supplement statement or a paraphrase of that statement. An inaccurate item can be created in one of the following two ways:

   a. Negation: Rewording a supplement statement to have the opposite meaning. If the statement is worded positively, negation is accomplished by adding a negative word or phrase to the statement. If the statement is worded negatively, negation is accomplished by taking out a negative word or phrase.

Example of a test item created by negation

Supplement statement: Exercise or play in very cold temperatures can cause frostbite.

Test item: Exercise or play in very cold temperatures cannot cause frostbite.

b. Mutual exclusivity: Transforming a supplement statement to communicate a message that is mutually exclusive with the original message. This transformation can be accomplished by either (1) changing a single verb, adjective, or adverb in the original statement to a word or phrase with a contradictory meaning, (2) changing a comparative statement to either reverse the direction of the comparison made or make both terms being compared equal.

Examples of test items created by transformation to a mutually exclusive statement

Supplement statement: Heat cramps are the least dangerous of the heat problems.

Test item: Heat cramps are the most dangerous of the heat problems.

Supplement statement: Playing or exercising in cold weather is usually less dangerous than playing or exercising in hot weather.

Test item: Playing or exercising in hot weather is usually less dangerous than playing or exercising in cold weather.

7. A test item will contain a maximum of 20 words. These words will be no higher than a fourth grade reading level on the IOX Basic Skills Word List. Technical terms not found on the word list or above a fourth grade reading level may be used only if they are listed on the Technical Terms Supplement.

8. A test will contain an approximately equivalent number of accurate and inaccurate test items. These items will be selected according to the following procedures:

   a. One item will be randomly selected from each section of the supplement.

   b. The rest of the items will be randomly selected from the supplement as a whole.

c. All of the items will be reviewed by content experts and modified as needed based upon this review.

9. All of the procedures for creating accurate and inaccurate test items will be used as equally as possible, with the exception of negation of a positively-stated supplement statement. This type of change will be used only when no other transformation is possible, as it results in a test item which requires the respondent to recognize that a negatively-stated idea is not accurate, in effect creating a double negative.

RESPONSE ATTRIBUTES

1. Two response columns will be provided. One column will be labeled "TRUE" and the other will be labeled "FALSE."

2. The correct answer to a question will be "TRUE" if the statement is accurate, or "FALSE" if the statement is inaccurate.

SPECIFICATIONS SUPPLEMENT

AVOIDING INJURY

Nature of Exercise in the Heat

1. Much of the heat built up by the body during play or exercise escapes as sweat.

2. During play or exercise in damp weather, sweat dries up slowly and body temperature begins to rise.

3. Heat problems can result when the body can no longer control its temperature.

4. High temperature, dampness in the air, and lack of wind or clouds are things which can lead to heat problems.

5. How long and how hard a person exercises, and how much water the person drinks before and during play or exercise can make a difference in whether or not the person gets heat problems.

6. Each person reacts differently to exercising in the heat.

7. Physically fit people have fewer problems playing or exercising in the heat because their bodies are better able to control body temperature.

8. People with big muscles or people who are overweight lose the most water while playing or exercising in the heat and are in danger of developing heat problems.

Heat Related Disorders

9. Dehydration, or the loss of too much water from the body, is the greatest cause of heat problems.

10. Heat cramps, heat exhaustion, and heat stroke are heat problems.

11. Heat cramps are the least dangerous of the heat problems.

12. Heat cramps usually happen when salt and water are lost from the body through dehydration.

13. A heat cramp is a painful tightening of a muscle, often in the lower leg.

14. Heat exhaustion can happen when the body begins to sweat less than it needs to.

15. Heat exhaustion is the first sign that the body is becoming less able to control its temperature.

16. Some signs of heat exhaustion are weakness, breathlessness, dizziness, fast heart beat, and a body temperature of around 101°F.

17. Heat stroke can happen when the body is unable to control its rising temperature.

18. Some signs of heat stroke are hot, dry skin, a body temperature of 105°F or higher, no sweat, great confusion, and unconsciousness.

19. If not treated by a doctor right away, heat stroke can lead to brain damage and death.

20. Some early warning signs of heat problems are goose bumps on the chest and upper arms, chills, pounding in the head, unsteadiness, nausea, and dry skin.

21. People should stop playing or exercising as soon as they feel any signs of heat problems.

22. Heat problems are less likely if a person drinks enough liquids to take the place of water lost during exercise or hard play.

23. A person should drink plenty of liquids before, during, and after playing or exercising in the heat.

24. Body water lost during play or exercise can be put back into the body by drinking either water or other liquids such as juice or soda.

25. People who play or exercise for a long time in the heat may need to put back body salts lost in sweating.

26. People can avoid heat problems on hot and damp days by playing or exercising in the cooler parts of the day, exercising less than usual, and wearing light, loose-fitting clothes.

27. The chances of having heat problems become greater if people wear rubber or plastic suits, sweat shirts, or sweat pants while exercising in hot weather.

Exercise in the Cold

28. Cold problems can happen when the body begins to lose heat faster than it can be built up.

29. Cold problems are a result of exercising in very low temperatures and are made worse by wind or damp air.

30. Playing or exercising in cold weather is usually less dangerous than playing or exercising in hot weather.

Cold Related Disorders

31. Exercising or playing in very cold temperatures can cause frostbite.

32. Frostbite is the freezing of a part of the body, usually the fingers or toes.

33. People who play or exercise outdoors on cold days should wear several pieces of clothing on each part of their body, keep their hands covered, and wear a hat.

Exercise at High Altitudes

34. At high altitudes, play and exercise can be more difficult until the person gets used to the altitude.

35. Some signs of altitude sickness are headache, breathlessness, fast heart beat, and not being hungry.

36. People who are not used to high altitudes should cut down on how long and how hard they exercise or play.

Muscle, Bone, and Skin Problems

37. Muscle, bone, joint, and skin problems can happen when a person either is not trained well enough for a certain type of exercise or play or uses the wrong techniques or equipment.

38. Sunburn can usually be avoided by wearing sunscreen lotion and a hat, or by avoiding long periods of exercise or play in the sun.

39. Pain in the joints, feet, ankles, or legs mean that a person should stop or reduce exercising or playing.

40. Problems caused by injuries using the wrong equipment can be avoided if the equipment used for exercise or play is correctly chosen, built, fitted, and used.

41. Following the rules of a game, using equipment the right way, and learning the right ways to move during exercise and play can help a person avoid getting hurt.

42. Warm-up exercises are important because they stretch and loosen the muscles, raise the body temperature, and speed up blood flow to the heart, lungs, and muscles.

43. Warm-up exercises help protect against muscle and bone damage.

44. Cool-down exercises are important because they continue the flow of blood to the muscles.

45. Cool-down exercises help to avoid some muscle problems.

46. Being in good physical shape can help a person avoid heart and lung problems.

47. During exercise or play, a person should slowly build up to the highest level of activity and then cool down slowly to avoid heart and lung problems.

48. A person should call a doctor right away if there is pain in the left side or middle of the chest, or in the left neck, shoulder, or arm during or just after exercising.

TECHNICAL TERMS SUPPLEMENT

AVOIDING INJURY

altitude
ankle
confusion
dehydration
dizziness
equipment
exhaustion
frostbite
joint
liquid
lung
muscle
muscular
nausea
physical
plastic
radiation
stroke
sunburn
sunscreen lotion
sweat
technique
unconsciousness

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TEST SPECIFICATIONS

SELECTING AN EXERCISE PROGRAM

GENERAL DESCRIPTION

Individuals are presented with personal physical fitness goals for fictitious persons. Individuals are asked to select from among four possible plans the exercise program most appropriate to each described person's physical fitness goal. The correct choice will be an exercise program that consists of activities that are appropriate in type, duration, frequency, and intensity to attain the personal physical fitness goal for the person described.

SAMPLE ITEM

This test presents descriptions of individuals who want to select an exercise program that will meet their personal physical fitness goals. All individuals have their doctor's approval to start such a program. Read each description. Then put a check (√) in the box under the plan that is most appropriate to achieve the fitness goal given.

1. Name: Roy Garvey
   Age: 28
   Fitness goal: cardiorespiratory endurance and flexibility

Put a check in the box under the plan that is most appropriate for Roy:

	PLAN A	PLAN B	PLAN C	PLAN D
Cardiorespiratory activity:	Running	Swimming	Tennis	Bicycling
Number of sessions per week:	3	4	2	4
Length of each session:	20 min.	10 min.	20 min.	25 min.
Target heartrate (for 10 seconds):	20-26	19-24	21-25	14-17
Other activities:	Calis-thenics	-	Yoga	-
(Check answer here)	☐ (correct)	☐ (insufficient duration)	☐ (insufficient frequency)	☐ (insufficient intensity and inappropriate intensity)

STIMULUS ATTRIBUTES

1. A test item will consist of information about a hypothetical individual and four proposed exercise plans for the individual. The information will have three entries: name, age, and fitness goal. The four proposed exercise plans will be displayed in a boxed form and have five entries: cardiorespiratory activity, number of sessions per week, length of each session, target heartrate (for 10 seconds), and other activities. The following directive will precede the proposed plans: "Put a check in the box under plan that is most appropriate for (name of individual):"

2. The directions will indicate that the individuals have their doctor's approval to start an exercise program.

3. The fitness goal entry will always contain the goal of cardiorespiratory endurance and may also include the goal of either muscular strength and endurance or flexibility.

4. The entries for the exercise plans will include the following:

   a. Cardiorespiratory activity - one activity that might plausibly meet the goal of cardiorespiratory endurance

   b. Number of sessions per week - a number between 1 and 7

   c. Length of each session - a time interval between 10 and 60 minutes

   d. Target heartrate (for 10 seconds) - a range spanning three to eight consecutive numbers between 10 and 35

   e. Other activities - one activity other than the activity listed in the cardiorespiratory entry or a dash indicating that no other activity is included in the exercise plan

5. Approximately one-third of the items on a test form will include a double fitness goal. Test items will be selected to sample the age range 16-70.

RESPONSE ATTRIBUTES

1. Four answer choices will follow each test item: Plan A, Plan B, Plan C, and Plan D. An answer choice will identify a proposed activity program of appropriate type, duration, intensity, and frequency to attain the physical fitness goal stated in the description.

2. The types of activity eligible for use in the exercise plans and the goal(s) met by each activity are as follows:

Activity	Cardiorespiratory Endurance	Muscular Strength and Endurance	Flexibility
Badminton	x		
Baseball/Softball			
Basketball	x		
Bicycling	x	x	
Bowling			
Calisthenics (general exercise)		x	x
Dancing	x	x	
Football			
Golf			
Handball/racquetball/ squash	x	x	
Hiking	x	x	
Jogging/running	x	x	
Judo/karate		x	x
Rope skipping	x		
Rowing	x	x	
Skating	x	x	
Skiing (cross-country)	x	x	
Soccer	x	x	
Stretching			x
Swimming	x	x	x
Tennis	x	x	
Volleyball			
Walking	x	x	
Weight training		x	
Wrestling	x	x	
Yoga			x

3. The appropriate duration, frequency, and intensity of the cardiorespiratory endurance portion of an exercise program are as follows:

   a. The duration must be at least 20 minutes per session.

   b. The frequency must be at least three sessions per week.

   c. The intensity must increase the individual's heart rate to a target or training heart rate that is 60 to 85% of the individual's maximal heart rate. Training heart rates are calculated based upon an individual's age, using the following formula:

$$\text{Formula: } \frac{(220 - \text{age}) \times (\% \text{ of maximal heart rate})}{6}$$

Age	Training Heart Rate per 10-second interval (60-85% of maximal heart rate)
16-20	20 - 29
21-25	19 - 28
26-30	19 - 27
31-35	19 - 27
36-40	18 - 26
41-45	18 - 25
46-50	17 - 25
51-55	17 - 24
56-60	16 - 23
61-65	16 - 23
66-70	15 - 22

4. Each of the three incorrect answer choices for an item will fall into one or more of the following categories:

   a. An exercise program that is not of sufficient duration, frequency, and/or intensity to achieve cardiorespiratory fitness - the program is not rigorous enough to develop adequate cardiorespiratory endurance. The values for the program's duration, frequency, and/or intensity fall below the recommended values. Such a program may be of insufficient intensity because the activity selected does not promote cardiorespiratory endurance and hence does not raise the target heartrate to an acceptable level.

b. An exercise program that is of excessive intensity for the individual - the program exceeds the recommended values for the individual's training heart rate. Such a program potentially could be physically harmful.

c. An exercise program that does not meet the fitness goal - the type of activity suggested does not meet the fitness goal stated in the item.

TEST SPECIFICATIONS

PREVENTING AND CARING FOR INJURIES

GENERAL DESCRIPTION

Individuals are presented with brief descriptions of situations in which a person wants to act to prevent or care for an exercise-related injury. Individuals select from among three possible options an appropriate course of action or indicate that none of the suggested options is appropriate.

SAMPLE ITEM

> **This test presents descriptions of individuals who want to prevent or care for exercise-related injuries. Read each description. Circle the letter of the appropriate action for the individual to take. If there is no choice presented that is appropriate, circle Choice D, "None of the above."**

1. Roger plays basketball on Saturdays with some friends. He wants to avoid spraining his ankles. An appropriate action for Roger to take would be to:

   (A) Tape his ankles and wear shoes with adequate support. (correct)

   (B) Perform cool-down exercises for five to ten minutes after playing ball. (ineffective)

   (C) Apply heat and cold to his ankles both before and after playing. (ineffective)

   (D) None of the above. (incorrect)

STIMULUS ATTRIBUTES

1. A test item will consist of a brief description of a person's participation in a specific exercise activity, followed by a statement of that person's goal. This goal will be either to prevent a specific injury commonly associated with the form of exercise or to care for an injury by reacting appropriately to it. The directive, "An appropriate action for (name of person) to take would be to" will follow.

2. For test items in which the person's goal is to prevent injury, the injury presented will be selected from one of the four categories described below:

   a. Trauma - injury caused by single or repeated blows to a bone, muscle, tendon, or ligament. Common traumatic injuries include strains, sprains, dislocations, fractures, contusions, abrasions, and lacerations.

   b. Overuse - injury caused either by exercising at a level of stress beyond that for which one is trained or by using improper techniques. Common overuse injuries include tendinitis, bursitis, blisters, calluses, and stress fractures.

   c. Environment - injury caused by exercising under environmental conditions to which one is not acclimated or against which one is not adequately protected. Such conditions include heat, cold, water, and high altitudes. Common environment-related injuries include frostbite, hypothermia, sunburn, heat disorders, and skin, ear, and eye infections.

   d. Illness - adverse physical condition brought on or aggravated by exercising. Common exercise-induced illnesses include stress reactions, cardiovascular problems, and viral infection of the heart muscle.

3. For test items in which the person's goal is to care for an injury, the injury or illness symptoms described will be selected from one of the four categories described below:

   a. Trauma injuries

      (1) Strain, slight sprains, and contusions

      (2) Abrasions and lacerations

      (3) Serious sprains, dislocations and fractures

   b. Overuse injuries

      (1) Blisters

      (2) Tendinitis and bursitis

      (3) Stress fractures

c. Environment-related injuries

(1) Frostbite

(2) Hypothermia

(3) Sunburn

(4) Heat disorders

(5) Skin, ear, and eye infections

d. Illness symptoms

(1) Abnormal heart activity, including irregular pulse (missed beats or extra beats); fluttering, jumping, or palpitations in the chest or throat; sudden burst of rapid heartbeats; or a sudden slowing of a rapid pulse rate.

(2) Pain or pressure in the center of the chest, arm, or throat, during or immediately following exercise.

(3) Dizziness, lightheadedness, sudden lack of coordination, confusion, cold sweating, glassy stare, pallor, blueness, or fainting.

(4) Nausea or vomiting after exercise.

(5) Extreme breathlessness lasting more than 10 minutes after the cessation of exercise.

(6) Prolonged fatigue up to 24 hours following exercise, or insomnia not present before starting the exercise program.

4. A test item will be no longer than 40 words in length and will contain no words above an eighth grade level on the IOX Basic Skills Word List. Technical terms not found on the word list may be used only if they are listed on the Technical Terms Supplement.

5. On a given form of the test, injury prevention and injury care will be represented approximately equally.

RESPONSE ATTRIBUTES

1. Four answer choices will follow each test item. The first three answer choices will describe a plausible action that an individual might take in order to prevent

or care for the injury described in the item. The fourth answer choice will be "None of the above." This choice will be used to indicate that none of the first three choices is an appropriate action to take in order to prevent or care for the injury.

2. For items testing prevention of injury, the correct answer choice either will describe a preventive action that is appropriate to the injury described or, if all of the choices given describe inappropriate responses, will be "None of the above." Appropriate preventive actions for each category of injury are as follows:

   a. Trauma

      (1) Perform warm-up exercises to guard against muscle, tendon, and ligament strains.

      (2) Use equipment that is properly designed, constructed, and fitted.

      (3) Wear protective clothing to guard against blows to the body.

      (4) Exercise in an environment that is free of obstacles and slippery areas and that has proper lighting and other safety features.

      (5) Follow the rules of a game and use proper techniques for moving and positioning the body during play.

   b. Overuse

      (1) Stop or reduce exercising at the onset of pains in the joints, feet, ankles, or legs.

      (2) Perform warm-up exercises to stretch and limber the muscles.

      (3) Use proper techniques for moving and positioning the body during play.

      (4) Exercise at the individual's accustomed level.

   c. Environment

      (1) Lessen the duration and intensity of exercise in heat or at high altitudes.

      (2) Replace liquids and salt lost through sweating.

(3) Exercise at those times of the day when adverse environmental effects are likely to be least extreme.

(4) Use appropriate equipment, clothing, and protective creams.

(5) Acclimate gradually to extreme environmental conditions.

(6) Stop exercising at the onset of symptoms of heat, cold, altitude, or water problems.

d. Illness

(1) Be in the proper physical condition to handle the physical stress associated with a particular exercise program.

(2) Use appropriate warm-up and cool-down procedures.

(3) Build up slowly to the target fitness level.

(4) Stop exercising at the onset of symptoms of cardiovascular problems.

(5) Avoid exercising during and immediately following a viral infection or illness.

3. For items testing care of injury, the correct answer choice either will describe an appropriate reaction to the injury or illness symptoms described or, if all of the choices given describe inappropriate responses, will be "None of the above." Appropriate reactions for each eligible injury or set of illness symptoms are as follows:

Symptoms	Appropriate Reactions
a. Trauma injuries	
(1) Strains, slight sprains, and contusions	Immobilize, elevate, and ice the injured area. Unless advised not to by a physician, take aspirin or aspirin substitute to reduce pain and inflammation. Resume exercising at a reduced level when the injured area is fully restored and movement is pain-free.

(2)	Abrasions and lacerations	For minor injuries, remove foreign material, wash with soap and water, and bandage. For serious injuries, elevate a severely bleeding limb, apply pressure to the wound to stop bleeding, and consult a physician immediately for treatment.
(3)	Serious sprains, dislocations, and fractures	Immobilize and consult a physician immediately for treatment.

b. Overuse injuries

(1)	Blisters	Cushion the injured area with moleskin or bandage. For advanced cases, release blister fluid with a sterilized needle, treat with antiseptic, cover with gauze, circle with foam rubber, and resume activity.
(2)	Tendinitis and bursitis	Rest and ice the injured area. Unless advised not to by physician, take aspirin or aspirin substitute to reduce pain and inflammation. Consult a physician if the injury persists.
(3)	Stress fractures	Immobilize and elevate the injured area. Consult a physician.

c. Environmental-related injuries

(1)	Frostbite	Warm the injured area by exposing it to skin, air, wet cloths, or water at room temperature. Exercise the rewarmed parts and then cover gently and elevate.
(2)	Hypothermia	Warm the body rapidly by wrapping in warm blankets or placing in warm water. Give hot liquids by mouth.

(3)	Sunburn	Apply cool water initially. When area is no longer hot to the touch, apply sunburn ointment. Protect from additional sun exposure.
(4)	Heat disorders	Stop exercising. Cool the body quickly by moving to a cool location and resting, sponging with cool water, applying cool wet towels, or immersing in cool water. Massage muscle cramps and give victim sips of salt water. Give the victim large quantities of plain water or other fluids. If victim vomits, take victim to hospital for intravenous salt solution.
(5)	Skin, ear, and eye infections	Consult a physician for treatment.

d. Illness symptoms

(1)	Abnormal heart activity, including irregular pulse, fluttering, jumping, or palpitations in the chest or throat, sudden burst of rapid heartbeats, or a sudden slowing of a rapid pulse rate	Stop exercising and call a physician immediately. See a physician before resuming. (The symptoms can be warning signs of cardiovascular problems.)
(2)	Pain or pressure in the center of the chest, arm, or throat, during or immediately following exercise	Stop exercising and call a physician immediately. See a physician before resuming. (The symptoms can be warnings signs of cardiovascular problems.)
(3)	Dizziness, lightheadedness, sudden lack of coordination, confusion, cold sweating, glassy stare, pallor, blueness, or fainting	Stop exercising and call a physician immediately. See a physician before resuming. (The symptoms can be warning signs of cardiovascular problems.)

(4)	Nausea or vomiting after exercise	Reduce the intensity of the activity and prolong the cool-down period. Avoid eating for at least two hours prior to the exercise session.
(5)	Extreme breathlessness lasting more than 10 minutes after the cessation of exercise	Reduce the intensity of the activity to a level that allows speaking during exercise.
(6)	Prolonged fatigue up to 24 hours following exercise, or insomnia not present before starting exercise program	Reduce the intensity of the activity. Reduce the duration of the total workout session if this symptom persists. Consult a physician if these self-correcting techniques do not remedy the situation.

4. Incorrect responses will be plausible actions that are likely to be ineffective in preventing or caring for the injury described in the item. "None of the above" will also be an incorrect response if a correct response is provided as one of the other response options.

5. Incorrect responses that are ineffective in preventing or caring for the injury described will be selected from the following:

   a. Direct violation of an appropriate action, as described in Response Attributes #2 and 3.

   b. Responding in a manner which is generally related to the situation described, but which is ineffective in preventing or caring for the injury described.

6. The response option, "None of the above," will be the correct response for approximately one-fourth of the test items.

7. Answer choices will be no longer than 18 words in length and will contain no words above an eighth grade level of the IOX Basic Skills Word List. Technical terms not found on the word list may be used only if they are listed on the Technical Terms Supplement.

TECHNICAL TERMS SUPPLEMENT

PREVENTING AND CARING FOR INJURIES

bursitis
cardiovascular
duration
hypothermia
intensity
lukewarm
tendinitis
viral influenza

TEST SPECIFICATIONS

EXERCISING SAFELY

GENERAL DESCRIPTION

Children are presented with brief descriptions of situations in which a person should act to prevent or care for an exercise-related injury. Children select from among three possible options the best action for the person to take.

SAMPLE ITEM

> **This test tells about people who want to prevent or care for an exercise injury. Read each question. Then circle the letter of the best action for the person to take.**

1. Roger plays basketball on Saturdays with some friends. He wants to avoid spraining his ankles. The best action for Roger to take is to:

   (A) Wear shoes with good support. (correct)

   (B) Do cool-down exercises for five to ten minutes after playing ball. (ineffective)

   (C) Put hot and cold cloths on his ankles both before and after playing. (ineffective)

STIMULUS ATTRIBUTES

1. A test item will consist of a brief description of a young person's participation in a specific exercise activity, followed by a statement of that person's goal. This goal will be either to prevent a specific injury commonly associated with the form of exercise or to care for an injury by reacting appropriately to it. The directive, "The best action for (name of person) to take is to" will follow.

2. For test items in which the person's goal is to prevent injury, the injury presented will be selected from one of the four categories described below:

a. Trauma - injury caused by one or more blows to a bone, muscle, tendon, or ligament. Common traumatic injuries include strains, sprains, dislocations, breaks, bruises, scrapes, and cuts.

b. Overuse - injury caused by exercising too hard or by using incorrect methods. Common overuse injuries include inflammation, blisters, calluses, and stress fractures.

c. Environment - injury caused by exercising under environmental conditions to which one is not adjusted or against which one is not well protected. Such conditions include heat, cold, water, and high altitudes. Common environment-caused injuries include frostbite, cold exposure, sunburn, heat exposure, and skin, ear, and eye infections.

d. Illness - poor health condition brought on or aggravated by exercising. Common exercise-caused illnesses include cardiovascular problems and viral infection of the heart muscle.

3. For test items in which the person's goal is to care for an injury, the injury or illness symptoms described will be selected from one of the four categories described below:

a. Trauma injuries

(1) Strain, slight sprains, and bruises

(2) Scrapes and cuts

(3) Serious sprains, dislocations and breaks

b. Overuse injuries

(1) Blisters

(2) Inflammation

(3) Stress fractures

c. Environment-related injuries

(1) Frostbite

(2) Cold exposure

(3) Sunburn

(4) Heat exposure

(5) Skin, ear, and eye infections

d. Illness symptoms

(1) Unusual heart beats, such as unsteady pulse (missed beats or extra beats), fluttering, jumping, or throbbing in the chest or throat, sudden burst of fast heartbeats, or a sudden slowing of a fast pulse.

(2) Pain or pressure in the center of the chest, arm, or throat, during or right after exercise.

(3) Dizziness, lightheadedness, sudden clumsiness, confusion, cold sweating, glassy stare, paleness, blueness, or fainting.

(4) Nausea or vomiting after exercise.

(5) Extreme breathlessness lasting more than 10 minutes after exercise.

(6) A very tired feeling lasting up to 24 hours following exercise, or sleeplessness not present before starting the exercise program.

4. A test item will be no longer than 35 words in length and will contain no words above a fourth grade level on the IOX Basic Skills Word List. Technical terms not found on the word list may be used only if they are listed on the Technical Terms Supplement.

5. On a given form of the test, injury prevention and injury care will be represented approximately equally.

RESPONSE ATTRIBUTES

1. Three answer choices will follow each test item. Each answer choice will describe a plausible action that an individual might take in order to prevent or care for the injury described in the item.

2. For items testing prevention of injury, the correct answer choice will describe a preventive action that is appropriate to the injury described. Appropriate preventive actions for each category of injury are as follows:

a. Trauma

(1) Perform warm-up exercises to guard against muscle, tendon, and ligament strains.

(2) Use equipment that is properly designed, made, and fitted.

(3) Wear protective clothing to guard against blows to the body.

(4) Exercise in an area that is clear and not slippery and that has good lighting and other safety features.

(5) Follow the rules of a game and use correct techniques for moving and placing the body during play.

b. Overuse

(1) Stop or reduce exercising at the start of pains in the joints, feet, ankles, or legs.

(2) Perform warm-up exercises to make the muscles stretch easily.

(3) Use correct methods for moving and placing the body during play.

(4) Exercise at the person's usual level.

c. Environment

(1) Exercise for less time and less vigorously in heat or at high altitudes.

(2) Take in liquids and salt to make up for what is lost through sweating.

(3) Exercise at those times of the day when environmental conditions are likely to be best.

(4) Use correct equipment, clothing, and protective creams.

(5) Get used to new environmental conditions slowly.

(6) Stop exercising as soon as there are signs of heat, cold, altitude, or water problems.

d. Illness

(1) Be in the correct physical condition to handle the physical stress that goes with the exercise program.

(2) Perform warm-up and cool-down exercises.

(3) Build up slowly to the target fitness level.

(4) Stop exercising as soon as there are signs of cardiovascular problems.

(5) Do not exercise during and immediately after a viral infection or illness.

3. For items testing care of injury, the correct answer choice will describe an appropriate reaction to the injury or illness symptoms described. Appropriate reactions for each eligible injury or set of illness symptoms are as follows:

	Symptoms	Appropriate Reactions
a.	Trauma injuries	
(1)	Strains, slight sprains, and bruises	Hold motionless, raise, and ice the injured area. Take aspirin or aspirin substitute to reduce pain unless advised not to by a physician.
(2)	Scrapes and cuts	For small injuries, remove dirt, wash with soap and water, and bandage. For bad injuries, raise an arm or leg that is bleeding a lot, press on the wound to stop bleeding, and see a doctor immediately for treatment.
(3)	Serious sprains, dislocations, and breaks	Hold motionless and see a doctor immediately.

b. Overuse injuries

(1) Blisters	Pad the injured area with moleskin or bandage. For water-filled blisters, let out blister fluid with a sterilized needle, put on antiseptic, cover with gauze, circle with foam rubber, and continue activity.
(2) Inflammation	Rest and ice the injured area. Take aspirin or aspirin substitute to reduce pain unless advised not to do so by a physician.
(3) Stress fractures	Immobilize and elevate the injured area. Consult a doctor.

c. Environmental-related injuries

(1) Frostbite	Warm the injured area slowly by touching it with skin, air, wet cloths, or water at room temperature. Exercise the warmed parts and then cover them gently and raise them.
(2) Cold exposure	Warm the body quickly by wrapping in warm blankets or placing in warm water. Give hot liquids by mouth.
(3) Sunburn	Put cool water on the area. Sunburn ointment may be used if the area is not hot to the touch. Protect from more sun.
(4) Heat exposure	Stop exercising. Cool the body quickly by moving to a cool place and resting, putting on cool water or cool wet towels, or putting the person in cool water. Massage muscle cramps and give victim sips of salt water. Give the victim plenty of water or other liquids. If victim vomits, take victim to hospital.

(5)	Skin, ear, and eye infections	See a doctor for treatment.

d. Illness symptoms

(1)	Unusual heart beats, such as unsteady pulse, fluttering, jumping, or throbbing in the chest or throat, sudden burst of fast heartbeats, or a sudden slowing of a fast pulse	Stop exercising. Call a doctor right away. See a doctor before exercising again. (The symptoms can be signs of cardiovascular problems.)
(2)	Pain or pressure in the center of the chest, arm, or neck, during or right after exercise	Stop exercising. Call a doctor right away. See a doctor before exercising again. (The symptoms can be warning signs of cardiovascular problems.)
(3)	Dizziness, lightheadedness, sudden clumsiness, confusion, cold sweating, glassy stare, paleness, blueness, or fainting	Stop exercising. Call a doctor right away. See a doctor before exercising again. (The symptoms can be signs of cardiovascular probmems.)
(4)	Nausea or vomiting after exercise	Exercise less vigorously and make the cool-down period longer. Do not eat for at least two hours before the exercise session.
(5)	Extreme breathlessness lasting more than 10 minutes after exercise	Exercise less vigorously so that speaking during exercise is possible.
(6)	A very tired feeling lasting up to 24 hours following exercise, or sleeplessness not present before starting exercise program	Exercise less vigorously. Exercise for a shorter period of time. See a doctor if the changes in exercise do not stop the symptom.

4. Incorrect responses will be plausible actions that are likely to be ineffective in preventing or caring for the injury described in the item.

5. Incorrect responses that are ineffective in preventing or caring for the injury described will be selected from the following:

   a. Direct violation of an appropriate action, as described in Response Attributes #2 and 3.

   b. Responding in a manner which is generally related to the situation described, but which is ineffective in preventing or caring for the injury described.

6. Answer choices will be no longer than 18 words in length and will contain no words above a fourth grade level on the IOX Basic Skills Word List. Technical terms not found on the word list may be used only if they are listed on the Technical Terms Supplement.

TECHNICAL TERMS SUPPLEMENT

EXERCISING SAFELY

blister
exposure
frostbite
hike
scrape
skateboard
soccer
sprain
sunburn
swelling
uncover
volleyball

TEST SPECIFICATIONS

EFFECTS OF EXERCISE

GENERAL DESCRIPTION

This inventory is a Likert scale in which respondents are asked to register their degree of agreement with a series of statements about the possible effects of exercise on a person's body image, sexuality, coordination, strength, social acceptability, personal adjustment, self-concept, ability to manage stress, and health.

SAMPLE ITEM

This survey describes some possible effects of regular exercise. Please respond to all the statements in the survey.

Read each statement. Decide the extent to which you agree with it. Circle the appropriate letter to the left of the statement. Use the following scale:

SA	=	**Strongly Agree**
A	=	**Agree**
U	=	**Uncertain**
D	=	**Disagree**
SD	=	**Strongly Disagree**

SA A U D SD 1. Exercise is helpful in reducing feelings of anxiety.

STIMULUS ATTRIBUTES

1. An item will consist of a statement about a possible effect of exercise. These effects will pertain to the areas of body image, sexuality, coordination, strength, social acceptability, personal adjustment, self-concept, ability to manage stress, and health.

2. The inventory will contain a proportionate number of items about each of the possible effects, with equal representation of the possibilities of exercise having a positive consequence and exercise having no impact or a negative effect.

3. Each statement will be 25 words or less in length. The words used will not exceed the eighth grade level on the IOX Basic Skills Word List with the exception of the following words: coordination, stress.

RESPONSE ATTRIBUTES

1. The following five response options will be available for each item:

SA	=	Strongly Agree
A	=	Agree
U	=	Uncertain
D	=	Disagree
SD	=	Strongly Disagree

2. Respondents are to use the response options to indicate the extent to which their beliefs about the effects of exercise are properly represented in an item's statement. Respondents circle the letter of their response to the left of each item.

SCORING AND INTERPRETATION

1. The rationale underlying this measure is that respondents who believe in the positive effects of exercise on body image, sexuality, coordination, strength, social acceptability, personal adjustment, self-concept, ability to manage stress, and health will more frequently (a) agree with statements which describe a positive consequence of exercise and (b) disagree with statements which describe exercise as having no impact or a negative effect.

2. Point values are assigned to items according to whether the consequence of exercise is seen as positive or non-positive (i.e., neutral or negative). Items which describe a positive effect of exercise are assigned the following values: SA = 5 points, A = 4 points, U = 3 points, D = 2 points, SD = 1 point. Items which describe a non-positive effect of exercise are assigned the following values: SA = 1 point, A = 2 points, U = 3 points, D = 4 points, SD = 5 points.

3. High scores indicate a strong belief in the positive effects of exercise on body image, sexuality, coordination, strength, social acceptability, personal adjustment, self-concept, ability to manage stress, and health.

MEASURE FORMAT

1. The following plan indicates the key characteristics of the "Effects of Exercise" inventory developed from these test specifications.

Item	Area of Effect	Exercise Perceived as Positive
1	Stress management	Yes
2	Sexuality	Yes
3	Coordination	No
4	Health	Yes
5	Strength	No
6	Social acceptability	No
7	Self-concept	Yes
8	Sexuality	No
9	Strength	Yes
10	Body image	Yes
11	Personal adjustment	Yes
12	Social acceptability	Yes
13	Stress management	No
14	Body image	No
15	Coordination	Yes
16	Self-concept	No
17	Health	No
18	Personal adjustment	No

TEST SPECIFICATIONS

EXERCISE AND PEOPLE

GENERAL DESCRIPTION

This inventory is a Likert scale in which children are asked to register their degree of agreement with a series of statements about the possible effects of exercise on a person's body image, coordination, strength, social acceptability, self-concept, ability to manage stress, and health.

SAMPLE ITEM

> **The statements below are about what exercise might do. Circle the word that shows if you agree with each statement.**
>
> **YES = I agree**
> **MAYBE = I am not sure if I agree**
> **NO = I do not agree**

YES MAYBE NO 1. Exercise helps people feel less anxious.

STIMULUS ATTRIBUTES

1. An item will consist of a statement about a possible effect of exercise. These effects will pertain to the areas of body image, coordination, strength, social acceptability, self-concept, ability to manage stress, and health.

2. The inventory will contain a proportionate number of items about each of the possible effects, with equal representation of the possibilities of exercise having a positive consequence and exercise having no impact or a negative effect.

3. Each statement will be 18 words or less in length. The words used will not exceed the fourth grade level on the IOX Basic Skills Word List, except for the following words: awkward, clumsy.

RESPONSE ATTRIBUTES

1. The following three response options will be available for each item:

YES	=	I agree
MAYBE	=	I am not sure if I agree
NO	=	I do not agree

2. Children are to use the response options to indicate the extent to which their beliefs about the effects of exercise are properly represented in an item's statement. Children circle their response to the left of each item.

SCORING AND INTERPRETATION

1. The rationale underlying this measure is that children who believe in the positive effects of exercise on body image, coordination, strength, social acceptability, self-concept, ability to manage stress, and health will more frequently (a) agree with statements which describe a positive consequence of exercise and (b) disagree with statements which describe exercise as having no impact or a negative effect.

2. Point values are assigned to items according to whether the consequence of exercise is seen as positive or non-positive (i.e., neutral or negative). Items which describe a positive effect of exercise are assigned the following values: YES = 2 points, MAYBE = 1 point, NO = 0 point. Items which describe a non-positive effect of exercise are assigned the following values: YES = 0 point, MAYBE = 1 point, NO = 2 points.

3. High scores indicate a strong belief in the positive effects of exercise on body image, coordination, strength, social acceptability, self-concept, ability to manage stress, and health.

MEASURE FORMAT

1. The following plan indicates the key characteristics of the "Effects of Exercise" inventory developed from these test specifications.

Item	Area of Effect	Exercise Perceived as Positive
1	Stress management	Yes
2	Coordination	No
3	Health	Yes
4	Strength	No
5	Social acceptability	No
6	Self-concept	Yes
7	Strength	Yes
8	Body image	Yes
9	Social acceptability	Yes
10	Stress management	No
11	Body image	No
12	Coordination	Yes
13	Health	No
14	Self-concept	No

TEST SPECIFICATIONS

EXERCISING REGULARLY

GENERAL DESCRIPTION

This measure is designed to assess individuals' perceived self-efficacy in being able to exercise regularly. Individuals are presented with a series of situations which might promote or serve as barriers to regular exercise and asked to indicate if they can exercise regularly in each situation. If they indicate that they can exercise regularly, then they are asked to estimate, on a 10 to 100 numerical scale, how confident they are of their ability to exercise regularly in that situation.

SAMPLE ITEM

This survey is about exercising regularly in various situations. Regular exercise requires 20 minutes or more of strenuous activity at least three times per week.

Read each statement. Circle YES or NO to show if you could exercise regularly in that situation. If you circle YES, then use the Confidence Scale to show how certain you are of your answer.

The following examples show how the Confidence Scale is used.

Physical Strength Examples	CAN YOU DO THIS?	IF YES, HOW CERTAIN ARE YOU?
You can lift a 50 pound weight.	(YES)/NO	70
You can lift a 200 pound weight.	YES/(NO)	____

Confidence Scale

10	20	30	40	50	60	70	80	90	100
Very Uncertain				Somewhat Certain					Very Certain

	CAN YOU EXERCISE REGULARLY?	IF YES, HOW CERTAIN ARE YOU?
1. You are on a vacation.	YES/NO	____

STIMULUS ATTRIBUTES

1. An item will describe a situation which might either promote or serve as a barrier to regular exercise. The item will be written in second person and will refer to someone's participation or feelings in a situation, for example, "You feel overworked."

2. The situations presented in test items will involve, directly or indirectly, time or financial constraints, availability of facilities or equipment, fear of injury, perceived lack of knowledge or ability, change in routine, social support, environmental conditions, or emotional or physical state.

3. Situations will be selected to be applicable to most individuals. For example, a situation describing an individual's being busy because of a job will not be used because potential respondents might not hold jobs. Situations in which individuals are generally busy, however, would be appropriate.

4. Each item will be 20 words or less in length. The words used will not exceed the eighth grade level of the IOX Basic Skills Word List.

RESPONSE ATTRIBUTES

1. For each item, two response opportunities are available, a YES/NO answer and a confidence rating.

2. Respondents are to use the YES/NO option to indicate whether they can exercise regularly in the situation given.

3. If respondents answer YES to an item, they are then to indicate how confident they are that they can exercise regularly in the situation described by selecting a number from the following confidence scale:

Confidence Scale

10	20	30	40	50	60	70	80	90	100
Very Uncertain				Somewhat Certain					Very Certain

SCORING AND INTERPRETATION

1. The rationale underlying this measure is that the more often respondents indicate that they can, with a high degree of confidence, exercise regularly, the stronger the perceived self-efficacy of those respondents in being able to exercise regularly.

2. This inventory can be scored in several ways, two of which are described here. In the first procedure, the number of YES responses is used as a gross index of an individual's perceived ability to exercise regularly. The more YES responses, the more situations in which individuals believe that they can exercise regularly.

   A combined analysis of YES/NO responses and confidence ratings allows for a more complete assessment of program effectiveness, as it incorporates both sources of information in a single index. This analysis is accomplished by computing the mean strength of the rated ability across all items; that is, by dividing the sum of the confidence ratings made in conjunction with "YES" responses by the number of items in the questionnaire. High scores reflect a strong perceived ability to exercise regularly across a variety of settings, along with a high level of confidence in that ability.

TEST SPECIFICATIONS

EXERCISE SURVEY

GENERAL DESCRIPTION

This measure is designed to assess the extent to which individuals intend to exercise regularly. Individuals are asked whether they intend to exercise regularly during specified future time periods. If individuals indicate that they intend to exercise regularly for a particular time period, then they are asked to estimate, on a 10 to 100 numerical scale, the strength of their intention.

SAMPLE ITEM

This survey asks about your intention to exercise regularly. Regular exercise requires 20 minutes or more of strenuous activity at least three times per week.

Read each question and circle YES or NO. If you circle YES, then use the Confidence Scale to show how certain you are that you intend to exercise regularly.

The following examples show how the Confidence Scale is used.

Physical Strength Examples	**CIRCLE YES OR NO**	**IF YES, HOW CERTAIN ARE YOU?**
Can you lift a 50 pound weight?	**(YES) / NO**	**70**
Can you lift a 200 pound weight?	**YES / (NO)**	**____**

Confidence Scale

10	20	30	40	50	60	70	80	90	100
Very Uncertain				**Somewhat Certain**					**Very Certain**

	CIRCLE YES OR NO	IF YES, HOW CERTAIN ARE YOU?
1. Do you intend to exercise regularly for the next week?	YES/NO	____

STIMULUS ATTRIBUTES

1. An item will take the form specified below, varying only in the temporal span cited, e.g., one week, one month, etc.:

   "Do you intend to exercise regularly for the next (specific time period)?"

2. The temporal spans specified will be time periods which are apt to be meaningful to respondents, for example, "one week" as opposed to "168 hours" (a week's worth of hours).

3. The temporal spans cited will be presented from shortest to longest, requiring respondents to consider their intentions to exercise regularly during increasingly longer time periods.

4. Each item will be 15 words or less in length. The words used will not exceed the eighth grade level of the IOX Basic Skills Word List.

RESPONSE ATTRIBUTES

1. For each item, two response opportunities are available, a YES/NO answer and a confidence rating.

2. Respondents are to use the YES/NO option to indicate whether they intend to exercise regularly during the temporal span given.

3. If respondents answer YES to an item, they are then to indicate the strength of their intention to exercise regularly during the temporal span given, using the following Confidence Scale:

   Confidence Scale

10	20	30	40	50	60	70	80	90	100
Very Uncertain				Somewhat Certain					Very Certain

SCORING AND INTERPRETATION

1. The rationale underlying this measure is that the longer the temporal span during which respondents indicate that they intend, with a high degree of confidence, to exercise regularly, the stronger the overall intention of those respondents to exercise regularly.

2. This measure can be scored in several ways, two of which are described here. In the first procedure, the number of YES responses is used as a gross index of an individual's intention to exercise regularly. The more YES responses, the longer the temporal span during which an individual intends to exercise regularly.

A combined analysis of YES/NO responses and confidence ratings allows for a more complete assessment of program effectiveness, as it incorporates both sources of information in a single index. This analysis is accomplished by computing the mean strength of the confidence ratings across all items; that is, by dividing the sum of the confidence ratings made in conjunction with "YES" responses by the number of items in the measure. High scores reflect a strong intention to exercise regularly for an extended period of time.

TEST SPECIFICATIONS

MY BODY

GENERAL DESCRIPTION

This measure is designed to assess children's respect for their bodies. Children are asked to indicate whether they would engage in activities which are healthful and avoid activities which are harmful to the body.

SAMPLE ITEM

> **Read each question. Then put a check (√) under the answer that best tells what you are willing to do to take care of your body.**

In order to take care of your body, are you willing to ...	CERTAINLY YES	PROBABLY YES	MAYBE	PROBABLY NOT	CERTAINLY NOT
1. ... exercise several times each week?	___	___	___	___	___

STIMULUS ATTRIBUTES

1. An item will specify a healthful activity or the avoidance of a harmful activity. Individuals are to indicate if they would be willing to take care of their bodies even if it means engaging in the healthful activity or avoiding the harmful activity.

2. The activities presented in the test items will be important to maintaining healthy bodies. These activities will include exercising; getting adequate rest; avoiding cigarettes, alcohol, and unnecessary drugs; following doctor's orders; seeing a doctor regularly; obtaining immunizations; eating properly; and avoiding unnecessary stress.

3. Each item will be 10 words or less in length. The words used will not exceed the fourth grade level on the IOX Basic Skills Word List, except for the following words: alcohol, cigarettes, diseases, immunizations.

RESPONSE ATTRIBUTES

1. The following five response options will be available for each item: CERTAINLY YES, PROBABLY YES, MAYBE, PROBABLY NOT, and CERTAINLY NOT.

2. Children are to use the response options to indicate their willingness to take care of their bodies in the specified manner. Respondents are to place a check in the appropriate space to the right of each item.

SCORING AND INTERPRETATION

1. The rationale underlying this measure is that the more often children indicate that they are willing, with certainty, to take care of their bodies even if it means engaging in healthful activities or avoiding harmful ones, the stronger their respect for their bodies.

2. Point values are assigned to items according to the certainty of the children in being willing to take care of their bodies, as follows: CERTAINLY YES = 5 points, PROBABLY YES = 4 points, MAYBE = 3 points, PROBABLY NOT = 2 points, CERTAINLY NOT = 1 point.

3. High scores indicate a strong respect for one's body, as evidenced by a willingness to engage in activities which are healthful and to avoid those which are not.

ANNOTATED EVALUATION BIBLIOGRAPHY

(1) American Psychological Association. Ethical principles in the conduct of research with human participants. Washington, D.C.: Author, 1973.

This treatise focuses on the appropriateness of carrying out various types of research investigations with human subjects. Because the American Psychological Association has had a long-standing concern about ethical issues in the conduct of research investigations, this publication will be of interest to numerous evaluators of health education programs.

(2) American Psychological Association, American Educational Research Association, National Council on Measurement in Education. Standards for educational and psychological tests. Washington, D.C.: Author, 1974.

This soon-to-be-revised volume presents the most widely used set of standards for psychological and educational tests. Frequently cited by users of educational tests, the standards have recently been employed in numerous judicial deliberations. Relatively brief, the standards should be consulted by health educators who employ assessment devices regularly.

(3) Anderson, L.W. Assessing affective characteristics in the schools. Boston: Allyn and Bacon, 1981.

Anderson provides an excellent set of practical suggestions for the creation of affective assessment instruments. He includes one of the most easily understood expositions of various scaling procedures including Likert, Thurstone, and Guttman scales.

(4) Berk, R.A. (Ed.). Criterion-referenced measurement: the state of the art. Baltimore: The Johns Hopkins University Press, 1980.

This collection of essays consists of papers presented at the first John Hopkins University National Symposium on Educational Research. The authors treat many of the important problems, both conceptual and technical, facing developers and users of criterion-referenced measures.

(5) Berk, R.A. (Ed.). Handbook of methods for detecting test bias. Baltimore: The Johns Hopkins University Press, 1982.

This collection of individual essays offers the reader an up-to-date depiction of methods currently available to detect the presence of bias in tests.

(6) Campbell, D.T., & Stanley, J.C. Experimental and quasi-experimental designs for research. Chicago: Rand McNally, 1966.

This volume, originally a chapter in a larger volume, has had substantial impact on the fields of research and evaluation. Evaluators of health education will wish to consider this truly classic treatment of data-gathering designs suitable for experimental and quasi-experimental settings.

(7) Churchill, G.A., Jr. Marketing research: methodological foundations (2nd ed.). Hinsdale, Ill: The Dryden Press, 1979.

Although written in the context of marketing research, this textbook covers several topics of vital importance in evaluation. Topics such as research design, data collection, sampling, and data analysis are covered in a readily understandable yet accurate way. An excellent resource.

(8) Cohen, J. Statistical power analysis for the behavioral sciences (Rev. ed.). New York: Academic Press, 1977.

Cohen offers a useful treatment of factors which should be considered when one draws samples for use in research or evaluation activities. Of special interest is the set of easy-to-use guidelines he offers for determining the estimated sample size necessary to detect differences between groups.

(9) Cook, T.D., & Campbell, D.T. Quasi-experimentation: design & analysis issues for field settings. Chicago: Rand McNally, 1979.

This widely cited volume provides a comprehensive treatment of quasi-experimental investigations in settings of substantial relevance to the concerns of health educators. There are excellent discussions included of internal and external validity, including the various threats to both types of validity. A systematic consideration of the commonly used data-gathering designs is offered, including an extended appraisal of interrupted time-series designs.

(10) Cook, T.D., & Campbell, D.T. The design and conduct of quasi-experiments and true experiments in field settings. In M.D. Dunnette (Ed.), Handbook of industrial and organizational psychology. Chicago: Rand McNally, 1976.

This is an updated version of the famous exposition of quasi-experimental and experimental data-gathering designs by Donald T. Campbell and Julian C. Stanley (see reference No. 6). An excellent discussion of four types of validity is featured in this essay.

(11) Cronbach, L.J. Course improvement through evaluation. Teachers College Record, May 1963, 64, 672-683.

An early piece, presenting the virtues of what would later be termed, "formative" evaluation. This article rings as true today as it did nearly two decades ago, and applies as much to evaluation in health education as it does to more traditional evaluation. Emphasizing the role of evaluation in gathering information which can improve programs, this article is well worth reading.

(12) Cronbach, L.J., and associates. Toward reform of program evaluation. San Francisco: Jossey-Bass, 1981.

A recent publication, this book considers the function of evaluation in a pluralistic society and presents 95 theses on the role of evaluators and evaluations. In addition to providing a contemporary conception of evaluation, it provides a historical and multidisciplinary perspective on the field. This volume will be of considerable interest to those evaluating health education programs.

(13) Cronbach, L.J., et al. Analysis of covariance in nonrandomized experiments: parameters affecting bias. Unpublished occasional paper, Stanford Evaluation Consortium, Stanford University, 1977.

A highly technical piece on the complications associated with using analysis of covariance, this article is recommended only for those prepared to handle a critical problem in a sophisticated way.

(14) Cronbach, L.J., & Furby, L. How should we measure 'change' - or should we? Psychological Bulletin, 1970, 74, 68-80

A technical treatise on the dangers associated with using gain scores. A very significant piece, but recommended only for those with some psychometric training.

(15) Ebel, R.L. Essentials of educational measurement (3rd ed.). Englewood Cliffs, N.J.: Prentice-Hall, 1979.

This is a standard, easily read introductory text, covering important topics in the field of educational testing. Ebel, a prominent leader of traditional educational testing practices, provides a lucid treatment of a wide range of measurement topics.

(16) Green, L.W. Research methods translatable to the practice setting: from rigor to reality and back. In S. Cohen (Ed.) New directions in patient compliance. Lexington, Mass.: Lexington Books, 1979.

Green deals with a practical dilemma facing those who evaluate health education programs, namely, the necessity to make trade-offs between validity and feasibility in field settings. Six strategies for coping with evaluation under adverse circumstances are described.

(17) Green, L.W., & Figá-Talamanca, I. Suggested designs for evaluation of patient education programs. Health Education Monographs, September 1974, 2 (1).

In this essay Green and Figá-Talamanca suggest data-gathering designs for conducting evaluations of patient education programs. The authors also explore several issues related to evaluations of this variety.

(18) Hambleton, R.K., et al. Criterion-referenced testing and measurement: a review of technical issues and development. Review of Educational Research, Winter 1978, 48 (1), 1-48.

This is a comprehensive review of the field of criterion-referenced testing. Hambleton and his colleagues do a masterful job of isolating the key issues in criterion-referenced testing, then describing results of research investigations bearing on those issues. Somewhat technical at times, this review is one of the more widely cited essays dealing with criterion-referenced testing.

(19) Hays, W.L. Statistics for the social sciences (2nd ed.). New York: Holt, Rinehart, and Winston, 1973.

A comprehensive text dealing with basic and advanced statistical considerations. Somewhat technical at points, Hays nonetheless provides an excellent set of step-by-step guidelines to statistical practice.

(20) Hull, C., & Nie, N.H. Statistical packages for the social sciences (SPSS). New York: McGraw-Hill, 1978.

This is a widely used, well organized set of "canned" computer analysis programs for use in the social sciences. Health educators who have occasion to use computer analyses will find the SPSS manual most helpful.

(21) Joint Committee on Standards for Educational Evaluation. Standards for evaluations of educational programs, projects, and materials. New York: McGraw-Hill, 1981.

The development of these evaluation standards was spearheaded by a joint committee of the American Educational Research Association, the American Psychological Association, and the National Council on Measurement in Education. Thirty standards are presented, addressing issues related to deciding whether to evaluate, defining the evaluation problem, designing the evaluation, budgeting for the evaluation, collecting and analyzing data, and reporting the evaluation. Intended for both consumers of evaluation and individuals conducting evaluations, this reference may be of most use to evaluators who are relatively new to the field.

(22) Levin, H.M. Cost-effectiveness analysis in evaluation research. In M. Guttentag & E.L. Struening (Eds.), Handbook of evaluation research (Vol. 2). Beverly Hills, CA.: Sage, 1975.

This essay probes the important considerations involved in determining cost-effectiveness of programs in the context of educational evaluations. Theoretical as well as practical guidelines are provided.

(23) Linn, R.L., & Slinde, J.A. The determination of the significance of change between pre- and post-testing periods. Review of Educational Research, 1977, 47, 121-150.

This article reviews many of the major issues in the measurement of change from pretesting to posttesting periods and suggests possible alternatives. These authors share the general sentiment of many others in the field that, "more is expected from gain scores than they can reasonably be expected to provide."

(24) Lord, F.H. Elementary models for measuring change. In C.W. Harris (Ed.), Problems in measuring change. Madison: Wisconsin Press, 1963.

An early treatise on the problems associated with measuring change. Although this chapter rapidly becomes very technical, the early sections provide an intuitive explanation of the difficulties with using gain scores.

(25) Oakland, T. (Ed.). Psychological and educational assessment of minority children. New York: Brunner/Mazel, 1977.

This collection of essays provides a series of useful suggestions for those who would become more sensitive to the possible bias present in educational tests.

(26) Popham, W.J. Educational evaluation. Englewood Cliffs, N.J.: Prentice-Hall, 1975.

This is an introductory text, written in fairly non-technical language, about the field of educational evaluation. Evaluators of health education programs will find it simple to translate the book's contents to their own specialties.

(27) Popham, W.J. Modern educational measurement. Englewood Cliffs, N.J.: Prentice-Hall, 1981.

This is an up-to-date treatment of varied topics in the field of educational measurement. Norm-referenced measurement and criterion-referenced measurement are both considered, with the special applications of criterion-referenced assessment emphasized. Chapters on the relationship of testing to teaching and the measurement of affect will be of special interest to health educators.

(28) Popham, W.J., & Sirotnik, K.A. Educational statistics: use and interpretation (2nd ed.). New York: Harper and Row, 1973.

This is an easily read introductory text dealing with the fundamental types of statistical considerations needed by program evaluators. It is intended for those who are not particularly comfortable with mathematical approaches to statistics.

(29) Riecken, H.W., & Boruch, R.F. Social experimentation: a method for planning and evaluating social intervention. New York: Academic Press, 1971.

This significant contribution to our thinking about large scale social interventions, their design and appraisal, provides a useful analysis of the ways that the experimental method can be employed defensibly in connection with major social programs.

(30) Rivlin, A.M., & Timpane, P.M. (Eds.). Ethical and legal issues in social experimentation. Washington, D.C.: Brookings Institution, 1975a.

Rivlin and Timpane explore the sorts of legal and ethical issues to which evaluators of health education programs must attend.

(31) Scriven, M. Prose and cons about goal-free evaluation. Evaluation Comment, 1972, 3, 1-4.

In this essay Scriven offers goal-free evaluation as an antidote to excessive preoccupation with the program staff's expressed objectives. Scriven argues that evaluators should attend to the results produced by a program, not the rhetoric of its program goals.

(32) Scriven, M. The methodology of evaluation. In R.E. Stake and others (Eds.), Perspectives on curriculum evaluation. Chicago: Rand McNally, 1967.

This seminal article was the first essay in which Scriven distinguished between the now commonly accepted formative and summative roles of evaluators. Scriven ranges over a wide variety of topics, emphasizing the importance of comparative appraisals of two or more programs' merits.

(33) Siegel, S. Nonparametric statistics for the behavioral sciences. New York: McGraw-Hill, 1956.

This is the classic treatment of nonparametric statistical techniques. Although a bit out of date these days, Siegel's text offers the most easily understood treatment of nonparametric statistical procedures. Because of the author's admitted zealousness in support of nonparametric techniques, those using Siegel's text should also consult a critique of it by Robert Savage, Journal of American Statistical Association, 52 (September 1957): 331-344.

(34) Suchman, E.A. Evaluative research: principles and practice in public service and social action programs. New York: Russell Sage Foundation, 1967.

In this volume, Suchman provides extensive coverage of the application of the experimental research model in conducting evaluations. Although evaluation has come a long way since this book was written, it provides a clear description of the predominant conceptualization of evaluation in the past decade.

(35) Tukey, J.W. Exploratory data analyses. Reading, Mass.: Addison-Wesley, 1977.

Creative approaches to displaying and understanding data are provided by Tukey in this excellent demystification of data analysis.

(36) Webb, E.J., Campbell, D.T., Schwartz, R.D., Sechrest, L., & Grove, J.B. Nonreactive measures in the social sciences (2nd ed.). Dallas: Houghton Mifflin, 1981.

This charming volume provides readers with a series of powerful and clever tactics to secure data, particularly of an affective nature, without sensitising respondents to the evaluator's purposes.

(37) Weiss, C.H. Evaluation research: methods of assessing program effectiveness. Englewood Cliffs, N.J.: Prentice Hall, 1972.

Weiss offers a pithy overview of prominent program evaluation considerations including the formulation of questions to be addressed, the design of the evaluation study, and the utilization of evaluation results. A paperback, this brief book (160 pp.) offers an excellent introduction to what Weiss refers to as "evaluation research."

(38) Worthen, B.R., & Sanders, J.R. Educational evaluation: theory and practice. Worthington, Ohio: C.A. Jones, 1973.

This volume was one of the earliest compilations of various program evaluation models applied to education. Included in the evaluation theorists whose views are presented in this book are Stake, Cronbach, Scriven, Tyler and others. Worthen and Sanders have authored sections of the book and have included a series of original chapters by a number of evaluation specialists. While focused on educational evaluation in general, the volume is of substantial relevance to program evaluation of health education programs.

(39) Zdep, S.M., & Rhodes, I.N. Making the randomized response technique work. (Reprinted from The Public Opinion Quarterly, Winter 1976-1977, 41.)

This easily read essay describes the randomized response technique, a procedure used to obtain sensitive information from respondents more accurately than if respondents were directly asked about sensitive information.

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